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Customer/Founder Convention I

It was thought, by many members of the British Steel Founders' Association, who last week met their customers in conference, that it was the first occasion that such a gathering had taken place. Actually it was the third, but in some respects, especially technically, last week's was the most important. The locale was well chosen, as No. 45 Park Lane is an imposing and dignified building well adapted for the purpose of a conference of this character. There was sufficient room for the staging of an exhibition, divided into two sections one showing practice and the other theory. Included in the latter—as it had been the concern of the British Steel Founders' Research Division—was an excellent model of a traditional pedestal grinder assembled side by side with one furnished with the new and better type of dust-extracting apparatus. The conference and exhibition were opened by the Rt. Hon. David Eccles, P.C., the Minister of Works, on the invitation of Mr. T. H. Summerson, chairman of the Association.

Earlier, we stated that from the technical angle this was the most important founder/customer conference so far staged and we base this view on the twin facts: that steel castings are used for the most important duties and are the most difficult castings to make, because the temperature of molten steel is not very much below fusion point of the refractories in which it is cast. Moreover, the conference attracted the attendance of a large number of really important customers, both designers and buyers. The opening paper was by Mr. Frank Rowe, who had carried out a number of tests with wrought and cast steel to show that the latter had equal and in many cases superior mechanical properties as compared with the former, if and when these tests were taken at right angles to the direction of rolling or working. He established—and on this there was no dissension—that the material from which steel castings were made was every bit as good as the wrought product, but it had to be sound. It was at this point that the criticisms of the customers were most useful. The defects, occasionally arising can be ruled out as being adventitious; those arising in the most complicated of castings can be viewed with sympathy, but when they arise in simple shapes, ideal for casting, they must be viewed with alarm. Cases were cited of defective gear-wheels and easy-to-make railway castings. This type of occurrence must be reduced to a minimum, if the industry's goodwill is to be retained.

The customers, represented by Mr. R. A. Riddles, C.B.E., of British Railways, Mr. A. C. Annis, of Metropolitan-Vickers, and the people who took part in the discussion, were both tolerant and helpful in their criticisms. The founders on their side cited cases where the customers were not helpful, quoting the receipt of poor patterns and the non-recognition of the inexorable laws of nature on the one hand and need to pay Savile Row prices for the highest quality on the other. For one repetition job, over £3,000 was paid for the pattern, yet the results justified the means. We intend to return to this subject next week.

Thorncliffe Experiment Continued

Novel Exhibition at Newton Chambers, Sheffield

So advanced have been the efforts of Newton Chambers & Company, Limited, Thorncliffe, near Sheffield, in the direction of securing improved personnel relations that they have become known the world over as "the Thorncliffe Experiment." Already, as part of the scheme, this large foundry, engineering and chemical firm operates superlative arrangements for the reception, training and well-being of apprentices and personnel generally, and last week the "experiment" was taken a stage further by the opening of a permanent exhibition designed to familiarize employees (and others) with the firm's multifarious activities.

In three sections, the exhibition presents "A New Industrial Relationship Plan in Operation," which it is believed has not been attempted by industry before in this country. Although the show will be permanent, its presentation will change as required. It is designed to show the Thorncliffe activities to the 4,000 employees so that each may see what others are doing, how the firm started, what its objects are, and what is the spirit of Thorncliffe as evidenced by its craftsmanship and its recreational and cultural facilities. Incidentally the exhibition enables the visitor to obtain a comprehensive picture of Thorncliffe which would take at least a day to obtain by touring the works, and enables one with but a short time available to choose places to see which are of major interest.

Sections Represented

The historical background is illustrated with illuminated maps and pictures of Thorncliffe as it was 160 years ago and as it is to-day, also with specimens of early partnership agreements, documents and indentures of the late 18th and early 19th centuries. The second section, Thorncliffe's work, shows the activities of the production departments, in many cases illustrated with models. Products made include gasholders, gasworks and coke-oven plant, chemical process plant, modern heating appliances, excavators, chemical and paper products, and the necessary castings for all these. The third section shows the training of youth at the works; the welfare, educational and cultural services; facilities for recreation and, above all, how interest and personal identification with the work of a great firm have been developed, with the consequent pride in handicraft. The workpeople at Newton Chambers are thus recognized and encouraged as craftsmen.

Introducing the exhibition to members of the Press, Sir Harold West, managing director of Newton Chambers, emphasized particularly its importance when receiving apprentices. On their first morning at the works, it was his practice to interview recruits himself, as this he believed was a time of crisis in their lives when they were particularly receptive, and when impressions received would become firmly absorbed. His conception of youth training was based on fostering a feeling of individual partnership in all enterprises, for instance there were 20 committees organized within the works for carrying on all sorts of social activities. Approbation of one's fellows is the greatest incentive, declared Sir Harold, explaining how foundry apprentices were encouraged to take home a small casting they had made at the end of each of the first weeks of their training, so that members of their household could admire their handiwork.

Some of the actual exhibits in the showroom had, perhaps, too much flavour of idiomatic method of expression, borrowed, one felt, rather too freely from the South Bank Festival Exhibition. For instance, a mural depicting scenes and activities within the works and executed by oblique light thrown on cut Perspex, needed quite a bit of working out as to what was the exact significance of each figure. Here the present writer echoes Sir Harold's view that captions might be an improvement. For the rest, universal approbation was given to the coloured pictures illuminated in various ways—there is always something very attractive about molten metal or red-hot steel treated in this way. Much admired, too, was the slick lighting which transformed a desolate scene of pit banks into the firm's well-ordered playing fields, over a period of 30 secs. viewing.

Beyond the mild criticism recorded earlier, the whole exhibition and above all the sentiments which inspired it deserve the full commendation of industry. After all, it is not unknown for an employee to be lining up to receive a long-service gold watch before getting his first insight into some of a firm's activities. This problem of spreading the team spirit among 4,000 or more is a very real one, but vital to productivity in the highest sense of the word, and Newton Chambers have tackled it in a most outstanding manner. Our industry, being basically a craft, finds it easier than most others to inculcate family spirit, but when employees reach the hundreds many foundries might do well to consider something on the Thorncliffe lines.

Conference on Non-destructive Testing

Yesterday members of the British Steel Castings Research Association from all parts of the United Kingdom attended a one-day conference on Non-destructive Testing, held at the Engineering Centre, Sauchiehall Street, Glasgow. Dr. R. Hunter, joint managing director of the Clyde Alloy Steel Company, Limited, was in the Chair, and some 75 persons were present.

The purpose of this conference was to present to members the results of the Research Association's development work related to radiography, and to radiological scanning in particular, and to consider the present and future application both of ultrasonic testing and of xero-radiography in relation to steel castings quality control. Papers, accompanied by demonstrations in each case, were presented by Mr. G. T. Harris (research manager, William Jessop & Sons, Limited, and chairman, B.S.C.R.A. non-destructive testing panel), by Mr. W. D. Oliphant (Ferranti, Limited) and by Mr. G. M. Michie (chief physicist, British Steel Castings Research Association).

An exhibition of the latest ultrasonic testing equipment was held in the Engineering Centre in conjunction with the manufacturers. This exhibition was opened to the public immediately after the conference and upon the following day.

Luncheon

BRITISH STEEL FOUNDERS' ASSOCIATION

As part of the customer/founder convention, a luncheon was held at the Dorchester Hotel, Park Lane, London, W.1. At the high table, presided over by Mr. T. H. Summerson, were the Rt. Hon. David Eccles, Minister of Works, the Rt. Hon. the Viscount Davidson; Mr. F. N. Lloyd; Brig. Sir Geo. S. Harvie Watt, BT.; Sir Ronald Garrett; Mr. Frank Rowe; Sir Arthur Croft; Mr. R. A. Riddles; Mr. H. F. Gibson; Mr. Cyril E. Lloyd; Mr. F. A. Martin; Mr. H. G. Lindsell; Col. R. H. Bright; Mr. H. V. Pemberton; Mr. T. R. Craig; Mr. C. Treherne Thomas; Mr. James Anderson; Mr. P. H. Wilson; Mr. A. R. Roebuck; Mr. C. M. Cock; Mr. W. H. Purdie; and Mr. C. C. Inglis.

British Industries Fair

Foundry and Engineering Exhibits at Castle Bromwich, Birmingham

This year's British Industries Fair, from April 27 to May 8, coincides with the pre-Coronation period and special efforts have been made to cater for overseas visitors, both at the engineering and hardware sections at Castle Bromwich and the textile and general sections at Earls Court and Olympia, London. The emphasis, therefore, is on finished goods, but nevertheless the products of foundries and machinery and raw materials for founders are well represented. It is impossible adequately to cover in these pages all the stands of interest to readers, but a few of those more directly affecting the industry are reviewed.

This year, the Castle Bromwich section of the British Industries Fair has been given a special Coronation *décor*, which is conveyed by 20-ft.-high tubular towers carrying pennants and flags which will be interspersed in the buildings and grounds. As is usual, there will be set days for group visits and Saturday, May 9 has been selected for works visits. The Fair is to be open from 9.30 a.m. to 6 p.m. daily except on the final day when it will close at 4 p.m.

It is perennially agreed that gadgets or devices on stands quite divorced from the foundry industry can provide the major interest for our readers. Quite frequently such items can give a foundryman ideas he can apply with advantage in his own shops and this year's Fair will be no exception. For those so minded, a browse round the stands at random is recommended, but for readers who prefer set objectives, the following notes have been compiled, keeping the emphasis on items shown for the first time.

Acru Electric Tool Manufacturing Company, Limited. (D.105). This firm are to show for the first time at the B.I.F. a high-precision engineers' square which should be of special interest to patternmakers, pattern checkers and casting inspectors. It incorporates a dial clock which enables an angular error to be read directly. The dial is calibrated to indicate up to 0.030 in error per foot plus-and-minus and the scale can be turned relative to the pointer and then fixed with a screw so that the pointer is at zero when the square is exactly 90 degrees. If due to rough handling or the square being dropped a slight distortion takes place, the zero point can easily be adjusted by putting the square against a known true 90 deg. angle and the scale then re-set to zero and fixed in that position. Together with this square, the firm will display a master square consisting of a casting of which the base is precision ground and instead of a square blade there are two tungsten-tipped screw-heads set to give an exact 90 deg. angle.

Edgar Allen & Company, Limited (D.536), exhibit a range of steel castings, small tools, permanent magnets, special tool steels, axle-box liners, etc. The steel foundry department exhibit includes two groups of castings; one covering electric-traction-motor castings (largest 15 cwt.), and the other steel castings for excavators (largest 33 cwt.). The permanent-magnet section will include a wide range of magnets of various types, and in addition, will present a panel in which various representative magnets will be grouped and linked up with illustrations of the actual products in which they are incorporated.

Sir W. G. Armstrong Whitworth & Company (Iron-founders) Limited and Jarrow Metal Industries (D.235/136). The products of these two famous firms include "Closeloy" rolls and on the stand a pair of 10.15 by 12.5 in. chilled-iron rolls are to be shown. Another interesting exhibit is a "Closeloy P.M." roll mounted vertically showing distinctly three stages in its manufacture. The first section of this roll is left as-cast, another section has been rough machined while the last section is finished. Typical of the large range of manufactures are the model 35 (16 by 9 in.) jaw crusher, weighing only two tons, and the 18 in. gyratory crusher, both of which are to be shown running light. A steel casting by Jarrow Metal Industries and a Beier infinitely-variable gear unit completes the list.

Bakelite Limited (C.404). In addition to items of general interest, this firm will be showing an array of foundry moulds and cores produced by the shell-moulding process, based upon synthetic resins. This has aroused considerable interest during the past year and the firm, having completed much pioneering work on the subject, is now mass-producing several different grades of resin for the purpose, as well as having developed a number of improvements, such as a means of bonding half-moulds together to eliminate the necessity for clips, etc.

Benford, Limited (1211/1110 Outdoor) will be featuring a petrol-driven wheelbarrow, which foundrymen visitors will have an opportunity of "driving." It is claimed that this barrow will move as much as will three men with ordinary hand barrows, under the same conditions. It has been designed for use in and out of doors and will negotiate rough, soft ground equally as well as hard, flat surfaces. It is 2 ft. 7½ in. wide, has a heaped capacity of 8 cub. ft. and will, the makers state, climb a gradient of 1 in 6 entirely under its own power and when carrying a load of 600 lb. The engine is of the four-stroke, air-cooled type and uses about a gallon of petrol a day. The barrow it is claimed is already extensively used in foundries for the handling of sand, moulding boxes, castings, etc. Because of its compact dimensions, it fits easily into lifts of the type used for cupola charging.

British Oxygen Company, Limited (D201/100).—This company's exhibits will include a demonstration of the "Argonaut" welding process for the first time at a function of this type. This is an automatic welding process using an inert-gas-shielded arc with a consumable electrode. It has great scope for all-position welding on heavy-gauge aluminium plate and light alloys and can also be used on stainless steel and copper-base alloys. The process has considerable application for assembling light-metal castings by welding. No flux is needed and welds are of good quality free from slags and inclusions. With multi-pass techniques, there is no practical thickness limit and comparatively few passes are needed because of the large amount of filler metal which can be deposited. Other new items to be demonstrated include Argonarc spot-welding equipment and the 55-in. Universal cutting machine fitted with the new MC 12 cutter and the 36-in. U.C.M., both using Cutogen one-piece nozzles.

British Industries Fair

Both of these latter machines are adaptable for powder cutting.

British Thomson-Houston Company, Limited. Stand (C511/410). On this stand are again to be displayed a selection of exhibits ranging from an 11-kv, 250-m.v.a switchgear unit for power station and industrial service to industrial electric heaters and fractional horsepower motors. Of particular interest to foundrymen are a comprehensive display of lamps and lighting; stator and rotor units consisting of a wound-stator in a steel shell together with a centrifugally-cast aluminium squirrel-cage rotor for "building-in" as an integral part of the machine. They are available in a wide variety of sizes from 1/10 h.p. upwards for running at speeds up to 24,000 r.p.m. A high-speed stator and rotor unit for a grinding machine running at 60,000 r.p.m. is to be seen running. The "Pyrobar" heating element consisting of a resistance spiral solidly embedded in magnesium oxide and protected from mechanical damage by an outer sheathing is to be featured. These heaters cover a range of temperatures up to 900 deg. C. and for most applications they are suitable for direct immersion in liquids and soft metals where chemical action does not affect the tube. The "Stacreep" crane control is to be demonstrated as a working exhibit on a complete crane crab operated by pendant push-button control.

British Tyre & Rubber Company, Limited (D.615) are to include exhibits of:—Anti-vibration mountings, for which a powerful compressor will be mounted on B.T.R. vibro-insulators standing on the unprepared exhibition hall floor without any special foundations; industrial boots, ranging from light Wellingtons for ordinary street wear to boots for every kind of industrial duty and including the stiff-toed Hood Bullseye, a general purpose industrial boot suited to foundrywork; shot-blasting and air hose, especially including anti-static shot-blast hose and, finally, there will be a display of foundry conveyor belts. In this section are the exhibited B.T.R. long-life belts representative of those that have played a large part in the mechanization of many modern foundries. Special emphasis is to be given to the heat-resisting belt used for carrying hot castings and hot sand as on knock-out conveyors. This belt is not only claimed to be tough and long-lasting under arduous conditions but highly flexible for fast, short-centre conveyors, which may be, because of space considerations, running on small-diameter drums.

J. Brockhouse & Associated Companies (D405/304). The following firms of the Brockhouse organization will be exhibiting selections from their range of products of special interest to foundrymen: Brockhouse Engineering (Southport), Limited, various 2- and 4-stroke air-cooled engines; Brockhouse Castings, Limited, iron and steel castings; R. J. Hunt & Son, Limited, grey-iron castings; Meldrums, Limited, acid-resisting castings, etc.; Kaye Alloy Castings, Limited, die-castings; Brockhouse Heater Company, Limited, "Gyral" oil-fired burners and Orme, Evans & Company, Limited, gas cookers and presswork.

Alfred Bullows & Sons, Limited (D.743/642). The main exhibit here for foundrymen will be the range of Hydrovane rotary compressors (Fig. 1), claimed to be remarkable for their high air output per horsepower used and for their extremely compact design, light weight and freedom from noise. This type of compressor has no valves, pistons, piston rings, connecting rod or crankshaft, the only moving parts being a slotted Meehanite rotor and a number of alloy-cast-iron vanes. These are submerged in oil and their working stresses are very low. Both portable and stationary units will be working on the stand. The firm's type PR.303E spray plants will be in operation as well as a 10-ft.-wide water-wash booth to be shown as a working exhibit with an automatic traversing spray gun and also incorporating a mechanical scummer. This provides for continuous removal of oversprayed paint from the water surface in the tank.

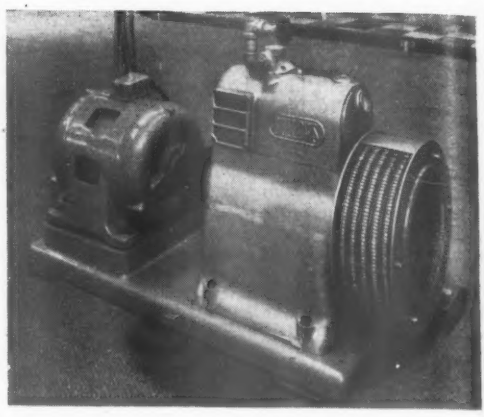


FIG. 1.—"*Hydrovane*" *Rotary Compressor on the Stand of Alfred Bullows & Sons, Limited.*

Colt Ventilation, Limited, (B.506), of Surbiton, Surrey, are exhibiting a complete range of industrial ventilators. One exhibit shows how a ventilation survey is carried out and details some of the schemes already installed in over 5,000 large factories. Arrangements will be made by the firm to survey the foundry of any interested enquirer and have a ventilation scheme prepared.

Copper Development Association (D.232), by means of photographs and display examples, invite founders and other users of copper and copper alloys to make full use of all their technical services, which are available free on request. The technical books published by the Association on applications of copper in many industries, and on the properties of copper and its many useful alloys, are prominently displayed.

Dallow Lambert & Company, Limited (D.539). Pneumatic dust-control equipment, is to be represented on this stand. Emphasis is particularly laid on unit type dust-collectors of which a complete range is being shown. The Drytex model is already well known to founders, but the most outstanding feature is a new range of "Dustmaster" units (Fig. 2) which are on show for the first time. Different sizes are available with a very large variety of fan, filter and dust-container combinations, which enable the equipment to cover practically any known range of application. A 5-ft 6-in. dia. cyclone is on show on the stand. "Drytube" fabric type filters, and the "Multiswirl" series of wet collectors are represented.

Electromagnets Limited (G.605). A very comprehensive range of this firm's products include a lifting magnet, swarf separator, high intensity chute-type magnetic

FIG. 2.—*Floor-stand Double Wheel Grinder with Dallow-Lambert Dustmaster D.M. 101 Collector*

separator and various types of permanent-magnet separators.

Of particular interest to founders is a large high-intensity overband-type magnetic separator, many of which are in use for the removal of tramp iron from foundry sand. This type of magnetic separator not only gives a continuous discharge of all collected iron but is also very easy to apply over existing conveyors, generally requiring very little alteration to existing layouts. Also exhibited is one of the Boxmag high-intensity conveyor-head units, built into a short band conveyor.

Foundry Equipment, Limited (D.301/200). As is to be expected, this stand will be solely at the service of foundrymen and practical working demonstrations will be given of the following equipment: F. E. (Sutter) automatic shell-moulding machine; R.S.M.3 resin-sand mixer; "Junior" automatic electric Sandrammer; B.1. hydraulic box-less high-speed moulding machine, with independent oil hydro-electric pump unit; F.E.2 hydraulic under-sand frame moulding machine, and complete semi-mechanized sand-conditioning and distribution plant incorporating the model B.M.2 batch-type sand mill.

On the **Fullers' Earth Union, Limited, (D.117),** stand, Fulbond will be the main exhibit and testing apparatus will be installed so that the effects of this material on natural, semi-synthetic and synthetic sands can be shown. Foundrymen will be interested to see the collection of castings in different metals made by users in their foundries and there will also be on show a number of cores containing Fulbond for giving extra green-strength.

Hale & Hale (Tipton), Limited, (D.609 and 508). The introduction of new mechanized plant at the Tipton, Staffordshire foundries of this firm has considerably improved the speed at which large orders can be handled, and for the first time since the war they can offer buyers early delivery of most types of castings. Permalite, a special-purpose high-duty alloy designed for hard wear and resistance to shock is featured on the stand. Several products are shown this year for the first time including the "Barslide" pit-prop head and special malleable-iron clips for use with the tram-rail type of steel sleeper on light-gauge railways. In addition there will be a wide variety of castings for electrical power overhead transmission systems, railways, agricultural equipment and vehicles of all kinds.

Imperial Chemical Industries, Limited (D.619 and D.308/409). The plastics and metals divisions of this group are exhibiting at Castle Bromwich. On the former, synthetic resins for use in foundries will be specially featured, and "Fluon" (polytetrafluoro-ethylene), which is now more readily available, will also be shown. A display of all the products made by the division will be shown on the combined British Plastics Federation stand. The metals division is displaying copper, brass, cupro-nickel, phosphor-bronze and other non-ferrous and wrought aluminium alloys in many forms.

I.T.D., Limited, (Industrial Truck Development), (Outdoor 1356), who are in association with Austin Crompton Parkinson Electrical Vehicles, Limited, will this year be exhibiting a very wide range of fork-lift trucks and associated handling equipment including a new battery/electric "Stacatruc" model 45EH/9. This has been specially designed to withstand the very arduous duties imposed upon fork-lift trucks in foundries and other heavy industries. The height-of-lift of this model is 9 ft. and maximum loadings are (20-in. centres) 4,500 lb. and (24-in. centres) 4,000 lb. A full programme of demonstrations will take place on the stand.

Jenolite, Limited, (B.221), this year introduce an improved paint stripper and degreaser, (P.S/5), a new version of a firmly established line. This alkaline chemical is in powder form, and for standard purposes is mixed in the ratio of 1 lb. to 1 gallon of water heated to 95 deg. C., and used in a mild steel tank. Other paint-stripping media and base coatings for painting steelwork will be included.

Keith Blackman, Limited, (D755/654). Among many examples from this company's extensive range of general and special-purpose fans included in this

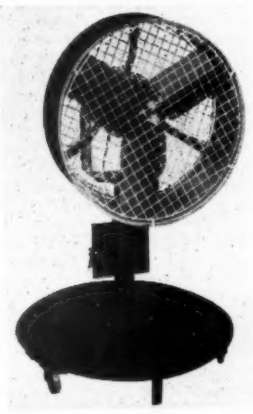


FIG. 3.—*"Tornado" Man-cooling Fan, 30 in. dia., made by Keith Blackman, Limited.*

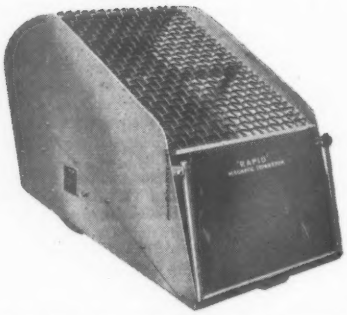


FIG. 4.—*New Portable Magnetic Separator for Foundry Sands, by Rapid Magnetic Machines, Limited.*

year's exhibit is a 30-in. model " Tornado " man-cooling unit (Fig. 3), which has special significance for founders in view of the increased trend towards improved working conditions. The model is made in five different sizes ranging from 15 to 36 in. dia., having a velocity of 1,470 to 8,660 cub. ft. per min. at discharge according to size, at speeds ranging from 1,400 r.p.m. to 950 r.p.m. Driving motors of full-load ratings from 0.2 to 0.8 b.h.p. are used. Air velocities 20-ft. from the fan range from 200 to 500 ft. per min. according to fan size. Other items include steam and electric unit heaters, a range of turbo-blowers, cupola-blowing fans, dust-collecting units and a new range of industrial gas equipment. This latter apparatus is designed for automatic control of industrial gas-burning equipment.

Metropolitan Vickers Electrical Company, Limited. (C.510.) The predominant feature of this company's display will be a single-phase on-load tap changer, type H. Other exhibits include: a 55-k.v. electron microscope, type EM4; a mass spectrometer, type MS3; a display of " Metrosil "; a flameproof motor fitted with a constant-level lubricator; a range of control gear and a model of 40,000-k.v.a. synchronous condenser.

Morgan Crucible Company, Limited (D.305/204). Many products here will be of interest to foundrymen, furnace designers and others. Among them will be two new refractories recently introduced—a super-duty firebrick " Morgan M.R.1.", and a low-storage insulating refractory " M.I.28." The former is effectively employed in aluminium and other non-ferrous reverberatory furnaces and the latter enamelling furnaces, electric furnaces, boilers, combustion chambers and high-temperature flue linings. The company's new range of combustion tubes for the estimation of sulphur and carbon in steel are now produced by mass production methods at low prices and are offered in a standard range of patterns and sizes. A display of " Salamander," and " Suprex " crucibles and plumbago foundry accessories will indicate the wide variety of products available in this material; the accessories will include a display of launders, muffles, knock-off riser plates, moulds, stoppers and nozzles, tundishes, stirrers, skimmers and bricks and shapes for steel ladles and other linings. Also of special interest for foundrymen are three recent developments, a plumbago ladle liner, a plumbago tube for degassing metals and " Morganite " pyrometer tip tubes. Another recent development to be shown is the ceramic strainer core, manufactured and sold by an associated Company, Coupe & Tidman Limited, of Treforest, Glam. Space does not permit showing any of the larger crucible furnaces from the Morgan range. but technicians will be in attendance to advise on use and installation.

Nordberg Manufacturing Company (D.719) will be showing working models including the Symons " F "-type horizontal screen, vibrating-bar grizzly, rod deck screen, hydrosizer screen and cone crushers. Information on the Symons " V " screen, a new machine in the range, will be available on request at the stand.

Radiation, Limited (501/400) will demonstrate a wide selection of solid-fuel-burning appliances. They will include a range of cookers, fires, convector grates, combination grates and heating appliances, all of which incorporate features to provide increased efficiency with greater fuel economy. Baths will also be shown, selected from the range made by Wilsons & Mathiesons, Limited. Exhibited for the first time will be conversion fires (to give overnight burning to combination grates), the " Eagle " boiler flue set Mark II, and the " Loray " fireplace suite.

Ransomes Sims & Jefferies, Limited, will show electric trucks **(1317)** the MG tractor **(1216)** and lawn mowers **(A502).** This firm's range of fork-lift trucks includes those of from ten to forty cwt. capacity, adaptable for use with varying types of load. 2-ton platform trucks are also available with fixed or elevating platform, side-tipping hopper or end-tipping types, and crane trucks exceptionally suitable for heavy single pieces. In addition, electric tractors on show will represent a range supplied in 20/30-cwt. and 6-ton capacities.

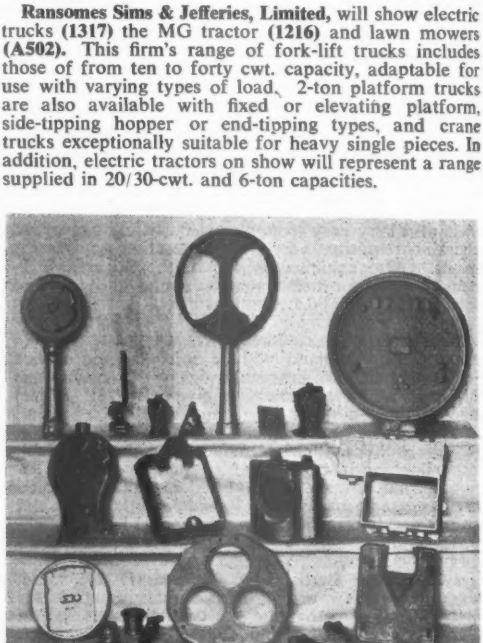


FIG. 5.—*Typical Grey-iron Castings from the Salter Range.*

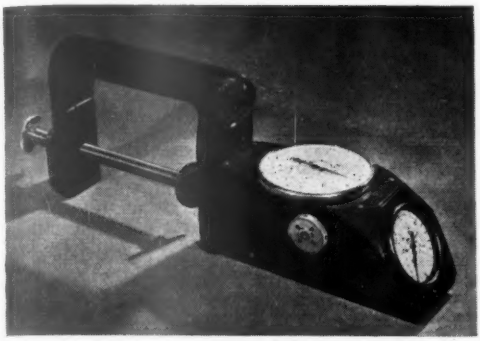


FIG. 6.—*"Indentometer" direct-reading Portable Hardness Tester, to be shown by C. Tennant, Sons & Company, Limited.*

Rapid Magnetic Machines, Limited (C.421), Lombard Street, Birmingham, 12, include examples of new equipment amongst their exhibits. Among both permanent and electro-magnetic separators and the new "Rapid" electro-magnetic vibratory chute-type separator, on this exhibit, the company will also demonstrate an entirely new portable foundry separator (see Fig. 4) for use in jobbing foundries to extract brads, gaggers, risers, and other ferrous items from foundry sand. Visitors will see the new "Rapid" flux-controlled chute, which utilises Alcomax 2 permanent magnets, and can be de-energized for the removal of accumulated tramp iron, as well as the "Magnalift," which is the company's newest addition to its wide range of Electro lifting magnets.

"Royal" Doulton & Company, Limited (D.302). In addition to their normal display of porous ceramics, this company are including several novel exhibits. These are (1) porous ceramic diffusers, which will be shown in operation; (2) fluidization displays—these simulate a small storage hopper fitted with diffuser tiles and a miniature air slide to indicate the way in which a powder can be assisted by diffuser tiles to flow from a hopper, and (3) static exhibits which show new fields in the introduction of large-size filter tubes into dust-recovery equipment. In addition there are various types and grades of porous ceramics such as are used in works laboratories.

Riley Stoker Company, Limited (D.617/516). In addition to the range of stokers shown by this company there will be a display of "Syntron" electric vibratory equipment which will illustrate the application of various feeder machines and a spiral feeder conveyor. The heavy-duty feeder with back magnet assembly to be shown is an example of the large Syntron machines and has a capacity of approximately 100 tons per hour of sand.

George Salter & Company, Limited. These stands **(D.328 and A407/306)** will contain examples of the firm's springs, grey-iron castings (Fig. 5), roller bearings, weighing machines, spring balances, and components of a crane weigher of 200 tons capacity—the largest capacity weighing machine of its type in the world—which is being made for the English Steel Corporation of Sheffield.

C. Tennant, Sons & Company, Limited (D.107) are to show the new "Indentometer," a direct-reading portable hardness tester which is claimed to be speedy and accurate in operation. A 120 deg. cone diamond indenter, a $\frac{1}{16}$-in. or $\frac{1}{8}$-in. dia. steel ball is used and readings on various Rockwell scales are obtainable, the depth of the impression being measured. The "Indentometer" is provided with a standard clamp capable of testing materials of up to 6 in. thick or 5 in. dia., and alternative clamping attachments are available for larger work including a chain clamp.

Wolf Electric Tools, Limited (C.603), are to exhibit their complete range of electric tools and will incorporate some newcomers of interest to founders on their stand. Although full details are not available at the time of going to Press, there will be a new saw (type RS7), a new portable grinder (type GQ6) and a die-grinder kit (type DG1). Qualified technicians will be in attendance to provide demonstrations.

Norwegian Metal Exports

Roughly one quarter of Norway's entire export trade is represented by the value of the export of ores and metals. Figures now released show that ores and metals exported last year earned £45,100,000 or 24 per cent. of total exports. Earnings last year were £10,000,000 greater than in the previous year, although the general tendency among exports as a whole was static. In 1947 ores and metals earned only £12,000,000 and represented only 14 per cent. of total exports. The big increase in these earnings was due largely to the resumption of production of iron ore at the Sydvaranger Mines in North Norway, the largest in Norway, and which were destroyed during the war.

In the metals field, the principal export consists of ferro-alloys. The production of these increased considerably last year, and most of the production was exported. Particularly notable is the rise in output of ferro-silicon, which was 40,000 tons a year before the war; in 1952 it was about 100,000 tons.

Pig-iron and certain special types of steel are also being exported, and one firm has recently been exporting large quantities of rolled steel wire to this country.

Dissolution of I.M.C. Sulphur Committee

The Sulphur Committee of the International Materials Conference announced last week that its member governments have agreed to the dissolution of the committee on April 30. This follows the committee's recent decision to discontinue international allocation of crude sulphur as from March 1 and reflects the continuing improvement in the supply and demand position of sulphur.

The Sulphur Committee, which was the second of the commodity groups to be established within the framework of the I.M.C. met for the first time on March 1, 1951. The committee's recommendations for the first international allocations of crude sulphur were accepted by its member governments for the third quarter of 1951 and allocations were continued on a quarterly or half-yearly basis until March 1, 1953.

HANDLEY PAGE, LIMITED—Mr. G. C. D. Russell has been appointed assistant managing director and Mr. J. H. S. Green secretary and chief accountant.

New Catalogues

Towel Service. The Initial Towel Supply Company of 300, Goswell Road, London, E.C.1, and 35 branches describe a towel service given by automatic machines, which introduces distinct economies as there are 180 clean portions and they are difficult to filch. They are obviously preferable to the roller type.

Melting Furnaces—Sklenar Furnaces, Limited, of Colchester Estates, Colchester Avenue, Cardiff, have published a new catalogue dealing with the type 050 small melting furnace for use in the jobbing foundry. Its format makes it suitable for putting in the breast pocket. It is available to our readers on writing to Cardiff.

Hydraulic Jacks. Tangyes Limited, of Cornwall Works, Smethwick, Birmingham, have used a four-page leaflet to describe and illustrate a line of light-weight hydraulic jacks which they have developed. The range made goes from 15 to 50 tons. To illustrate lightness, a jack capable of lifting 15 tons, six-and-a-half inches, weighs but 24 lb. The leaflet is available to our readers on application to Cornwall Works.

Synthetic-resin Core-binder. Aero Research Limited, of Duxford, Cambridge, have sent us a four-page leaflet which after a general statement and a list of claims, details, very usefully, the method to be used for coremaking when using their particular brand, "Resolite 400." A table is included of a number of formulations together with the properties yielded. On the last page more useful data are printed. The leaflet is available to readers on application to Duxford.

Gas Burners. Schieldrop and Company, Limited, of Stotfold, Beds., have sent us a catalogue covering the subject of a self-proportioning gas burner for ensuring a constant air/gas ratio. This has every appearance of being a useful system as with most burners, when an extra throughput is desired, there has to be individual adjustment of the air and gas. With this booklet was a four-page leaflet dealing with a similar type of adjustment for oil burners. The catalogue and leaflet are available to our readers on writing to Stotfold.

Dust Respirator. Every foundry executive should have in his possession a four-page leaflet issued on the "Microfilter" dust respirator issued by Siebe, Gorman and Company, Limited, of "Neptune" Works, Davis Road, Tolworth, Surrey. It is a model which owes its development to the work of the Committee on Industrial Health of the British Steel Founders' Association. After submission to the Ministry of Labour & National Service the model has now been officially certificated. The leaflet carries a warning that cleanliness is an essential for efficient use and cleaning instructions are included for establishing efficient maintenance. On the last page is a useful list of code words to facilitate the acquisition of spare parts.

Safety Boots.—Inserted in a catalogue (and moreover a very nice catalogue) received at the stand of Wilkins & Denton, Limited, 51-52, Woburn Place, London, W.C.1, is a leaflet showing "Totectors" safety shoes for women. These, in the reviewer's opinion, are much more elegant than many of the backless sloppy ones worn by the young woman of to-day. The catalogue itself is devoted to men's wear and they are of such nice appearance that the temptation to be resisted to reserve them for town wear is only too obvious. Safety shoes are, as reference to foundry accident statistics well prove, important items in ensuring freedom from foot injury. The catalogue is available to our readers on writing to Woburn Place.

Fewer Unemployed Last Month

Unemployment in Great Britain decreased by 31,800 to a total of 397,000 in the month between February 16 and March 16, according to statistics issued last week by the Ministry of Labour. The number of unemployed represented 1.9 per cent. of the total number of employees, compared with 2.1 per cent. for both February last and March, 1952.

The number of wage-earners on colliery books showed no change during February, but there was a drop of 14,000 in the number employed in the metal, vehicle, and engineering sections of the manufacturing industries. Of the 397,000 unemployed, 173,100 had been out of work for more than eight weeks, while there were 112,000 on short-time working. There was a fall of 9,000 in the total working population during the month, reducing this figure to 23,276,000, the fall being represented by 4,000 men and 5,000 women.

Latest Foundry Statistics

According to the Bulletin of the British Iron and Steel Federation for March, employment in iron-foundries decreased, on February 7 to 148,966 from the total of 149,650 on January 10 and 154,991 in February, 1952. In steelfounding, however, there was a slight gain during the month of 16 people, bringing the total employed on February 7 to 20,756, about 600 more than in 1952. The average weekly production of metal for making steel castings during February rose from 11,400 tons in the previous month (11,100 tons in February, 1952) to 11,600 tons.

According to the British Bureau of Non-ferrous Metal Statistics, the output of copper-alloy castings for the first two months of this year was 8,382 tons as compared with 11,580 tons during the same period of 1952.

Iron and Steel Bill

Because some confusion may have been caused by the abstract from Lord Jessel's speech which was published in the JOURNAL of April 9, the relevant sentences from *Hansard* are quoted as follow:—

"Therefore we say it is wrong in principle that the Board should have the right of interfering in the delicate machinery of industrial relations in this (meaning the ironfoundry) section of the engineering industry. Up to a point, the Minister seems to have appreciated this view, because he took out the 'tied' foundries from this field of supervision when the Bill was before another place. But the iron foundries are still left in. Surely this is illogical."

From the earlier abstract it appeared to read that "tied" foundries were excluded completely from the Bill.

Last Monday, John Harper & Company, Limited, of Willenhall, staged at their London offices in Buckingham Gate an exhibition of their finished goods, to which they invited the trade Press. Amongst the exhibits was a new design of mincing machine, which by streamlining well lends itself to vitreous enamelling. With rubber pads for the feet and the tightening screw at an angle with the table top, a materially improved design has been evolved. Other exhibits which appealed to the visitors were a combined gas-fired radiator and towel rail for bathroom use and a money savings box in the form of the coronation chair.

Castings for the Smithy and Forge*

By W. S. Spenceley

A description is given of some castings for power hammers and friction drop-hammers, as well as their mode of functioning and the requirements demanded of such plant. Case histories are given of the various items emphasizing methods of running and risering. Chilling or heat absorption methods are contrasted with pressure feeding and mould-assembly methods are described. Core-production and the co-ordination of venting methods leads to consideration of the degree of skill required in craftsmen selected for such work. Finally, control methods in use at the Author's foundry are surveyed.

Castings are the same the world over, the difference being the method of manufacture. Each foundry has its own particular methods, but whatever the method, the production of large castings is to a great extent dependent on the ability of the skilled foundry employee. The major requirement in any casting is, of course, soundness, and this calls for considerable skill, knowledge, and, in some cases, risks in experimenting by all concerned, especially where section thickness varies considerably. Very few realize how narrow is the line of demarcation between success and failure in foundrywork.

Whilst the types of castings manufactured for the Author's works are fairly standard, the variety is extremely large, and it can be rightly claimed that it is a jobbing foundry, and there is no better training ground for a moulder who is craft conscious than the jobbing foundry. The description of castings being made lays particular stress on one of the largest cylinders. A single metal composition is used and ferro-silicon is added at the spout to raise the silicon content to suit particular castings. Anvil-block castings are an exception; in this case a standard mixture is laid down and very little deviation takes place. This is essential when dealing with castings of such massive section. Fig. 1 shows the general view of the heavy foundry of Joseph Berry, Limited. It is 282 ft. long, 60 ft. wide and 60 ft. to the roof apex, and is serviced by two 30-ton overhead travelling cranes and four electric wall-jib cranes. The forepart is primarily for floor work and the top end, some 107 ft., is for box-moulded work under an impellor-type ramming machine.

* Paper presented to the Wales and Monmouth branch of the Institute of British Foundrymen. The Author is attached to Joseph Berry, Limited.

POWER-HAMMER CYLINDERS

A cylinder casting for a 40-cwt. pneumatic power-hammer is very intricate and needs great accuracy when coring up. It is essential that all centres come within reasonable accuracy both longitudinally and across the cylinder. For instance, if the distance from the base to the pump-piston position is either short or long, it means an alteration to the connecting rod. Both bores are machined and liners are not fitted. The valve-chest bore position is lower than the two cylinder positions and it is this side which is cast in the bottom of the mould. The valve chests for the larger types of cylinders are made as a separate casting and inserted into the major casting during machining. The whole of the machining is then completely finished after which the casting is subjected to a water test of 120 lb. per sq. in.

Fig. 2 shows the cylinder pattern, which is split through the centre. It is cast in the horizontal position with a 5 deg. drop of the cylinder bores from the horizontal. Centre-lines are marked on the joint side of the bottom half of the cylinder pattern, the most important ones being those for the two bores and the valve chest.

FIG. 1.—*General View of the Heavy Foundry of Joseph Berry, Limited.*

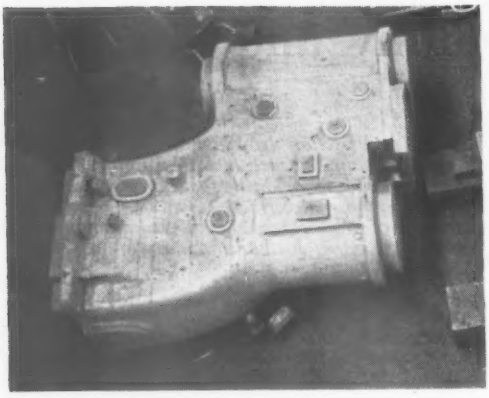


FIG. 2.—*View from above of the Pattern for a Power-hammer Cylinder Casting.*

A moulding pit in the shop floor which is invariably in a set position in relation to cranes and other tackle in the shop is first dug to the required size and depth, then a cinder bed four inches thick is laid in; two main vent pipes are connected and the whole is covered with straw. The bottom is then rammed to a depth of six in., the pattern is placed in position (supported on bricks at the extreme flange ends), lined up for parallel and adjusted where necessary. Then, after the pattern has been removed, a centre bed is struck for the valve chest from templates adjusted to the pattern during the initial setting-up stage. The pattern is then replaced on its supports and on the small bed.

Ramming under the bottom of the pattern forms the next operation which, as may be imagined, is fairly awkward and laborious. In Fig. 3 the main core supports are placed in position, together with the runners. The half-pattern is then again taken out, the mould bottom is tested for solidity, vented, and all other core supports are inserted, and this

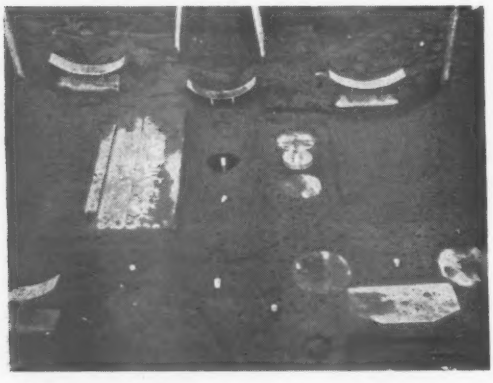


FIG. 3.—*Inside the Pit for the Cylinder Casting Showing the Bed Prepared and Core Supports in Position.*

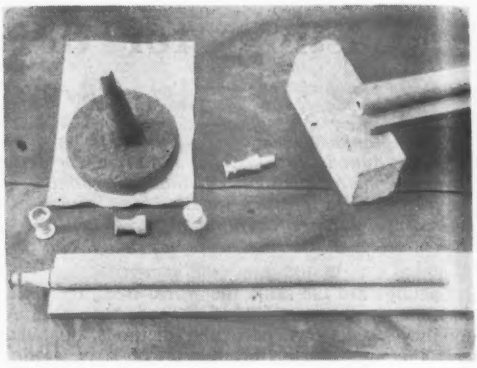


FIG. 4.—*Special Chaplets and Core Supports used in Jobs such as the Power-hammer Cylinder.*

section is partly finished and sprigged where necessary. It is at this stage that the valve chest can be seen more plainly, about equally spaced between the two valves. After these operations, the pattern is replaced in position and finally bedded down.

Support System and Running Arrangements

The chaplet arrangements used for castings of this kind are shown in Fig. 4. The bottom core support consists of a ¾ in. dia. mild-steel bar cast into an iron base piece. This is bedded into the mould bottom, so that the top of the bar is a ¼ in. below mould face. The stud itself, also made

FIG. 5.—*Another View of the Base of the Mould for the Cylinder, showing the Arrangements for Gating.*

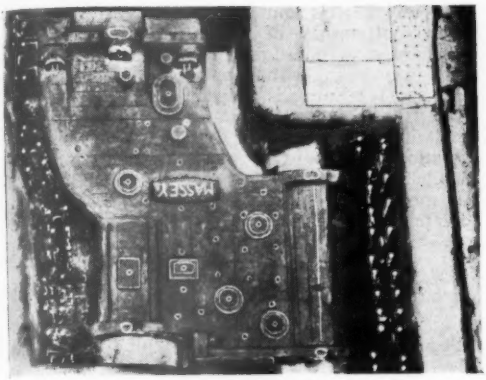


FIG. 6.—*View from above of the Cylinder Mould, with Ramming continued to the Joint Face and Grids inserted for Lifting the Top-part.*

FIG. 8.—*Top-part of the Cylinder Mould being Turned Over, Ready for Drying.*

out of mild steel and tinned, is recessed at the bottom to fit on the bar. These studs are made to suit any particular section thickness and to any diameter one considered suitable for supporting a core. The top chaplet arrangements, of a similar type, are constructed as follows:—The chaplet bar, of any diameter desired, is drilled ½ in. dia along its centre-line for 1½ in.; the stud, turned to any desired length or diameter, with a spigot ½-in. dia. by 1 in. long is also tinned. By this method, one can salvage the base and the chaplet bar after each cast and use them repeatedly.

Fig. 5 shows the runner-gate positions, one 2¼-in. square giving an area of about 5 sq. in. leading into the main flange, and the other, 3½-in. by 1-in., area 3½ sq. in. into the main body of the casting. It will be noticed that the body runner is placed so as just to miss the back of the 6-in. dia. core, which is inserted at this point—the intention being to direct the flow of metal into the valve chest, so as to equalize the distribution of metal as well as possible into the cylinder bores. Here, also, becomes apparent one of the reasons for the 5-deg. drop from horizontal; if examined carefully, it will be noticed that the base of the cylinder tends to run back towards the main flange when in the truly level position and the tendency would be when in this position for the metal to run back towards the main flange, away from the bores, which would be contrary to the object sought.

Moulding

After final bedding, ramming is continued to the level of the top-half of the pattern, when down-joints are made up to the centre and the top-joints are struck, the joint lifting grids are then bedded into position and then rammed up. (Fig. 6.) The top-part (Fig. 7) is placed on, and then all grids are scotched and bolted up. The chaplet stalks are next placed in position (incidentally locations for these are pre-determined and marked on the pattern) and ramming-up is completed. The top, after being suitably staked, is then lifted off together with the

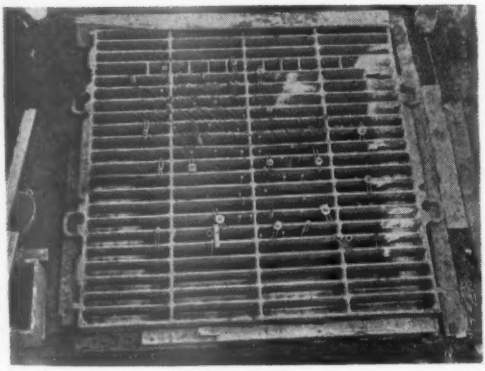


FIG. 7.—*Top-part Box placed over the Cylinder Mould Pit and Grids Scotched and Bolted.*

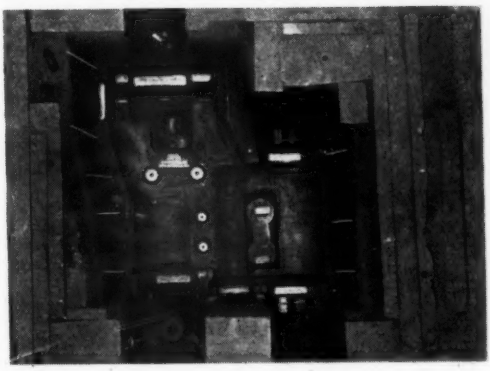


FIG. 9.—*Bottom-part of Cylinder Mould after Drying and Placing of the Smaller Cores.*

FIG. 10.—*Initial Strickling of One of the Main Barrel Cores for the Cylinder; it is of Brick Faced with Loam.*

top-half of the pattern. It is turned over; the pattern withdrawn; the mould finished and all small cores inserted.

This top-half (Fig. 8) is then turned back again ready for drying, which is done by means of portable mould-dryers, one placed at each end.

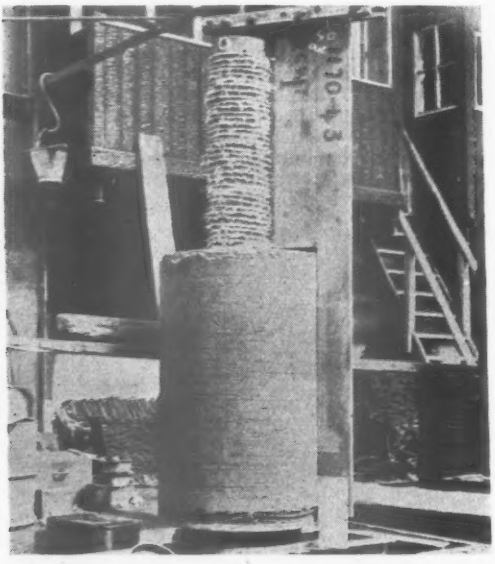


FIG. 11.—*Strickling of the Neck End of the Main Barrel Core after first winding Straw Rope around the Core-bar.*

The main barrels and valve-chest centres marked on the bottom-half of the pattern are transferred by means of standard staff templates to the mould joints prior to the withdrawal of the pattern. Each of these templates is respective to a particular centre, the main bottom flange being used as the base line for longitudinal setting. After these operations, the pattern is withdrawn, the mould completely finished and the small cores inserted. The mould-dryers are then placed in position and operate for a period of up to 56 hrs., during which time the mould is subjected to periodic inspection, until it is considered to be sufficiently dry (Fig. 9).

Cores

Fig. 10 shows one of the main-barrel cores which are brick built and strickled with loam. The pump-barrel core is carried out in two operations; a standard machined template ring is first set in position and through it the cast-iron neck-end barrel part is placed. The centre spindle is then inserted and passes into a receiving gland ring at the centre; the top of the spindle being located in the steadying arm. The bottom-end of the barrel is then made to fit into the receiving gland, which automatically centres that end. The spindle-arm and striking board are then set up and the plate end of the barrel adjusted to suit the machined ring, now being used as a striking edge. Four bolts from neck-end flange are located with a cross template at the top of the spindle, and a 9-in. wall is built, with binders every four courses. It is finished off

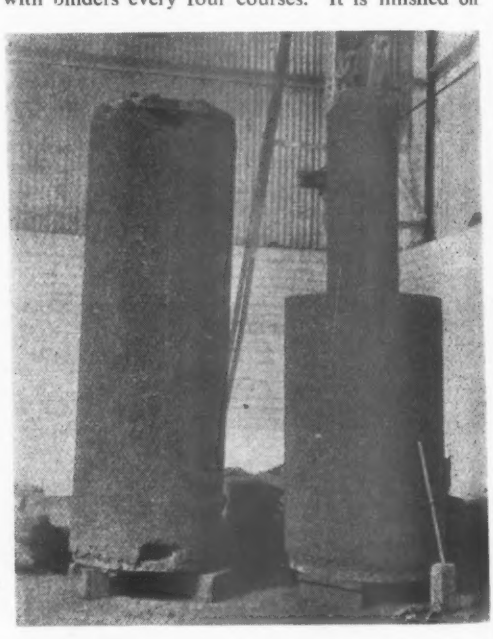


FIG. 12.—*(left) Hammer Barrel Core Struck-up in one Operation; Alongside (right) is a finished Main Barrel Core.*

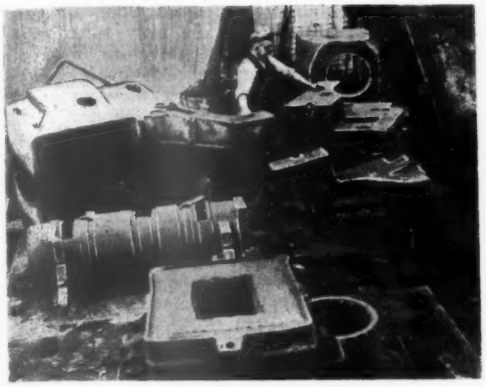


FIG. 13.—*Other Important Cores for the Power-hammer Cylinder Casting.*

with a top-plate, which is bolted down with the four long bolts, so tying the neck-end and the body together. The core at this stage is sent to the stove for the first drying operation, after which it is turned over and re-set to the spindle, with the receiving gland and machined ring reversed, (Fig. 11). The neck-end then is wound with straw rope struck up with loam and finally dried. The hammer-barrel (Fig. 12, left) being of uniform diameter, is struck in one operation, using the machined ring at the bottom for a striking line, and the same bolt-crossed template as was used for the pump barrel.

FIG. 14.—*Placing the Bottom Cores in Position in the Cylinder Mould and Checking their Centre-lines.*

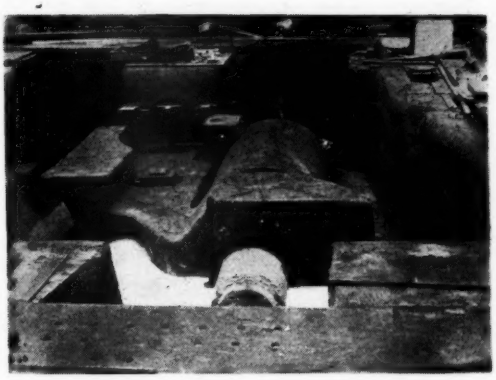


FIG. 15.—*Pump-barrel Core in Position in the Mould, with a Vent Pipe leading from its Rear End. The Other End is also vented.*

Fig. 13 shows some of the other main cores, including the main base-core, made in two halves and matched-up by the coremaker before being sent for assembly. The valve-chest core is also made in halves, these being similarly matched and jointed. The centre-line for the top-half of this core is marked in the core-box and reproduced on the core.

Assembly

Continuing the mould assembly, (Fig. 14), the centre-lines previously referred to are brought into use. The base line of the bottom core (first assembled) must be set to the bottom-flange line, ensuring a correct distance to the pump-barrel end and its centre line, from which datum point the succeeding cores are set. All the other cores are then assembled to the same centre-line. Templates are also used to adjust or correct the port positions; one can, by this method, be assured that all centres are reasonably accurate.

Fig. 15 shows the pump-barrel core in position,

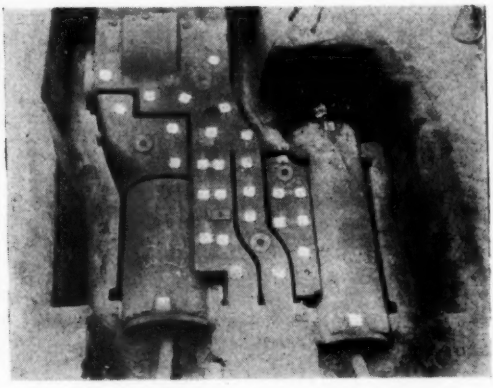


FIG. 16.—*Another View from above the Cylinder Mould after All Cores have been Assembled.*

FIG. 17.—*Brick-built Loam-coated Runner Box incorporating Flat Stoppers and a Filter Core.*

with a vent pipe at one end. A similar vent is also taken off the other end. At this stage the extent of the jacket-core surrounding the valve-chest and the neck-end of the pump barrel can be appreciated, Fig. 16 illustrates the complete assembly of all cores (this picture was taken after the top had been tried on). It shows the tinned plates which match up with the chaplet studs and the loam-sealed vents. Tubes are inserted through the top-part of the mould to pass directly into these vents, allowance being made to enable the moulders to ram around the tubes. The diameters marked on the barrels are taken from caliper sizes and are intended for centring purposes only.

Closing and Pouring

After the orthodox cleaning of the mould and final inspection, the top-part is placed on. One riser section is built on and dried along with the top-part. Actually this is the only functioning riser there is on these cylinders; there are, however, three dummy risers, one on each cylinder-bore flange. The objective is to cast these cylinders under pressure and the method adopted is as follows. The three dummy risers act as flow-offs and at the lowest point of the functioning riser there is also a flow-off, the bottom of the runner being built at a higher level than these flow-offs. On the completion of the pouring, all these risers function, taking off, to some extent, the initial casting strain. When the runner-box has drained and all flow-offs have ceased running, the three dummy risers are completely sealed, as is also the flow-off in the main riser. Reserve metal, which is standing-by in a smaller ladle, is then poured into the main riser until it is completely filled, thereby exerting maximum pressure on to the bores and valve chest. This also is another reason for the 5 deg. drop of that end of the cylinder. The top of the metal in the riser is skimmed off and then covered with an exothermic powder to retain as much heat as possible. The one noticeable thing about this method is that for a short period during the filling-up process, providing the rate of the metal-flow from the ladle is reasonable, no headway is made in the riser. Another proof of the proper functioning of the flow-offs is to fill the riser up rather quickly; stop pouring and watch the rapid fall of metal in the riser. A personal theory is that pressure exerted by the riser due to its height, and the possibility of core expansion taking place simultaneously, offsets liquid shrinkage. It has been a noteworthy fact that since adopting this method all chills have been eliminated and that results from the porosity and water-test points of view have been very satisfactory. The pouring of this casting is done from one ladle, and brick-built loam runners are used, incorporating loam-coated flat stoppers and a filter core through the centre of the runner box (Fig. 17).

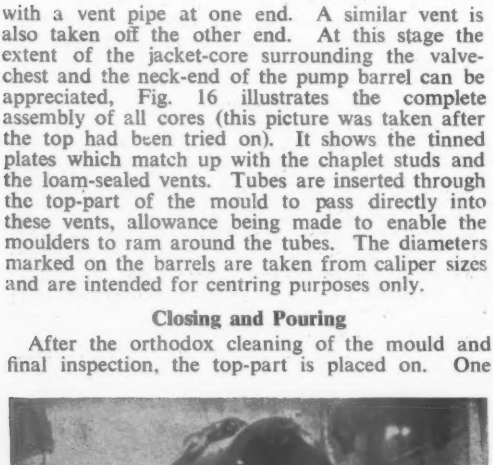


FIG. 18.—*Power-hammer Cylinder being Cleaned in a Hydroblast Chamber.*

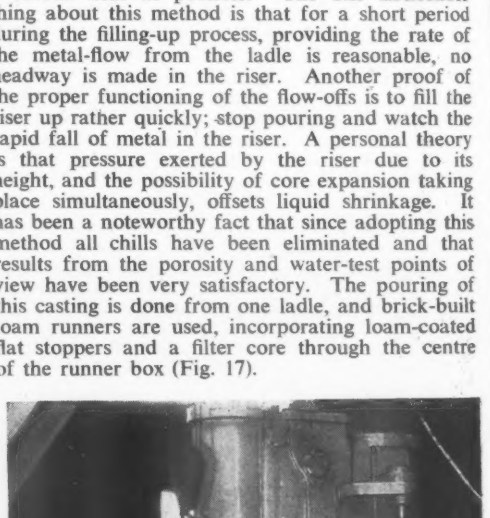


FIG. 19.—*Power-hammer of the Type for which the Making of a Cylinder Casting is Described.*

Dressing

The casting is cleaned by the Hydroblast process before being passed to the dressers. Not only is the sand washed out, but all grids and wrought-iron pieces are salvaged by the operators. The installation of this plant has considerably relieved the laborious conditions of the dressers and, where it is considered economical, core-grids can be and are re-claimed. Moreover, all the sand is classified and considered satisfactory for reclamation and re-use for the production of cores.

The weight of the casting is 11 tons 10 cwt., and for it is taken about 12 tons 10 cwt. of metal for casting plus the feed metal in a smaller ladle. The time for the pouring is in the region of 1¾ min. and the metal temperature is around 1,250 deg. C. The desired composition of the metal is:—TC, 3.10 to 3.25; Si, 1.15 to 1.3; Mn, 0.75 to 1.0; P, 0.25 max.; and S, 0.12 per cent. max. Ferro-silicon is added at the cupola spout to suit varying types of castings, additions of up to 0.7 per cent. being made.

Control Tests

Wedge tests are taken at various stages of the afternoon's cast, and, in all cases of major castings such as this, two or three wedge test-pieces are cast—first of the base metal for which the sample is quenched and broken to indicate the depth of chill, then after ferro-silicon is added to reduce the chill to the desired depth. The strength shown by the base iron is 14 tons per sq. in. in tensile, which after the ferro-silicon addition becomes 17 tons per sq. in.; on a 2.1-in. dia. bar the average Izod impact value is 15 ft.-lb. on a standard test-piece.

Photomicrographs of the metal taken from a 2.1-in dia. bar show flake graphite in a pearlitic matrix, with a trace of phosphide eutectic. The final composition analysis of the metal for the casting described was:—TC, 3.15; Si, 1.58; Mn, 0.88; P, 0.14; and S, 0.109 per cent.

The complete machine after assembly is tested on its block and diagrams are taken of its blow capabilities. A machine of this size has a stroke of 38 in., and is capable of delivering 80 automatic blows per min.; when working on mild steel of 13 to 22 in. square section its blow energy is equal to 43,000 ft.-lb. or approximately 19 tons. Fig. 19 shows a similar type of hammer to that described at work in forging cylinder rams.

(To be continued)

Continuous Lead-casting Machine

A continuous lead-casting machine for a chemical producer in Cheshire has been designed and recently installed by the Fraser & Chalmers Engineering Works of the General Electric Company, Limited. The machine has an overall length of 32 ft. 3 in. and is 6 ft. 2 in. high, with a total weight of 9 tons. The framework of the machine is built up of mild-steel channels and angles riveted and bolted together, carrying the driving sprockets supporting the rails upon which the moulds run. The distance between the centre of the driving sprocket and the centre of the radius of the discharge end rails is 28 ft.

Each of the 88 moulds, which form the basis of the machine, has a capacity of 1 cwt. in two pigs of 56 lb. each, and they are arranged to travel from the pouring point along the rails which have a gradient toward the discharge end of $\frac{1}{16}$ in. per foot, thereby reducing slightly the power required from the drive. The moulds form a continuous train around the track of the machine, except for a space at the discharge end, where by means of gravity and a slight bumping effect the solidified pig is discharged. The moulds are in no way connected with one another; each travels upon four bushed track rollers and each roller is fitted with a grease nipple for lubrication. At the driving and discharge ends, additional retaining rails are fitted on the outside radius to guide the moulds around the track.

Lead is poured at a temperature of 400 to 420 deg. C., the flow being controlled by manual operation. Contraction of the lead during its cooling period assists discharge, and the pig is ejected with the mould in a vertical position, the ejection being assisted by each mould bumping the preceding mould. After discharge the moulds return by gravity along the lower track to the feed end.

The driving arrangements consist of a 5 h.p. 955 r.p.m. motor driving two double-worm reduction gears in a reduction box mounted on a combined fabricated mild-steel bedplate. The reduction-box output shaft is fitted with a spur gear pinion driving a spur gear wheel which is in turn coupled to a driving sprocket engaging with the inner side of the track rollers.

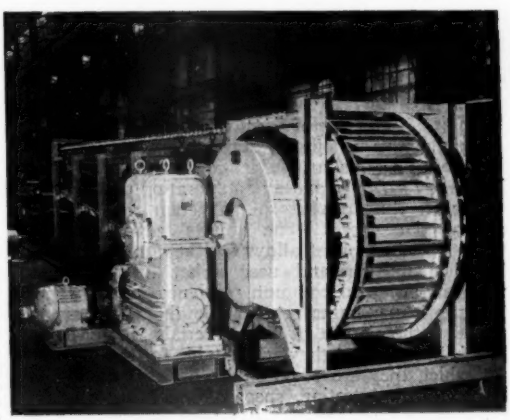


FIG. 1.—*Driving End of the Lead-casting Machine.*

The method of propulsion is for the toothed sprocket to engage with the bushed track rollers at the drive end and traverse them around the inner radius of the slide rails, the actual drive being transmitted by each mould pushing against its preceding mould. A running speed of 2.52 ft. per minute gives the machine a designed capacity of 400 pigs (10 tons) per hour. The time cycle allows ample time for cooling and enables the pigs to be ejected in the solid state. At the same time any dressing which the moulds may need may be accomplished during the return run to the drive sprocket.

Quality in Light-metal Castings

In times of keen competition, there is a strong temptation to lower standards of quality and service, and thus cheapen the product in order to keep up the volume of production. In this article, the Light Metal Founders' Association point out the dangers of such a course, recognizing that the growth of a young industry such as theirs is likely to be retarded, not accelerated, if short-sighted methods of development are adopted. They urge that, in ordering light-alloy castings, buyers should in their own interests always insist on conformity to standard specifications.

Perhaps the most generally recognized feature of the past 15 yrs in the field of metallurgy has been the tremendous increase in the volume of output of light metals. The impetus was provided, of course, by the necessity of building vast numbers of aircraft, for which lightness and strength were prime requisites. These twin requirements had to be fulfilled with certainty and precision—there was no room for guesswork or approximation, so materials were described and defined by standard specifications.

Peacetime uses of light metals do not as a rule call for the highest strength/weight ratio, either on technical or economic grounds, but it is none the less essential to make sure of the consistent quality of the materials to be used for any engineering purpose. In 1945, the British Standards Institution issued for the Ministry of Supply the BS/STA7 "Services Schedule of Aluminium and its Alloys," which was widely used as a general reference until the publication in 1949 of a series of British Standard Specifications covering aluminium and aluminium-alloy products for general engineering purposes.

Benefits of Standardization

Though the benefits of standardization apply to all products, this article is concerned only with light-alloy castings, and an enumeration of the main points affecting castings in particular may not be out of place here. The objects are: to restrict excessive variation of alloys for the convenience of founder, finisher and user alike; to provide a generally-accepted common reference in the welter of proprietary names; to enable the customer to appraise the nature of the materials offered, and satisfy himself that they are suitable for the purpose for which they are required; to define methods of inspection and testing, specify the chemical composition and property values appropriate to each alloy and to establish in advance an agreed procedure to be followed in the event of dispute.

BS.1490:1949 provides the means of attaining all these objects. By careful deliberation, a series of specifications has been drawn up to cover a range of alloys that will satisfy all normal engineering requirements. It includes not only the strongest available alloys, used so extensively and successfully in aircraft and wherever lightness has to be accompanied by high strength, but also the more workaday materials that possess adequate strength for lightly-stressed articles and are less costly to produce. It also includes alloys which are specially suitable for particular types of service—for example by reason of their resistance to corrosion, or their retention of strength at elevated temperatures, or their ability to acquire a decorative finish.

The existence of a series of specifications makes it easier to ensure that alloys used are suitable for the purpose which the castings are to serve, both by narrowing the range of choice to include only recognized materials and because the advice of founders who produce castings to specification is reliable and freely given. The importance of choosing the right alloy for any given job is widely appreciated nowadays, but was not always so. For instance, a year or two ago an investigation was held into the failure of aluminium-alloy components of public-service vehicles built prior to 1939. Nearly all the cast specimens analyzed were found to conform to no British Standard as regards composition, or to contain excesses of certain constituents detrimental to performance. Such haphazard ordering of castings would be unusual, and inexcusable, now.

Proper Viewpoints

With standardization firmly established, the light-metal industry in Britain is more fortunate than those in some other countries. It would be a thousand pities if this advantage were lost under pressure from competition. In the present trade-recession there is a very real temptation to buy in the cheapest market, with less insistence on quality. Within the last twelve months, buyers of industrial goods—materials, semi-finished products, plant and equipment—have become much more price-conscious. The world-wide shortages of both capital- and consumer-goods have now been made up as far as ability to pay for them will allow: with more goods available, the customer is able to exercise discrimination and, with less money with which to pay for them, he will assess values very carefully. This makes it all the more important not to sacrifice quality to cheapness, because the foundry industry in common with others cannot afford to dishonour the tradition of good workmanship that has sold British goods all over the world.

How, then, can competition be successfully met? Only by careful estimating and accurate costing. The smaller the margin of profit the more vital it is to know exactly what the position is. It would be foolhardy to take chances with materials, when unsuspected defects could upset the most carefully calculated transaction. In the field of castings, especially, the existence of accepted standards provides means of avoiding unnecessary risks.

(*Continued on page* 480)

Economical Use of Metals in the Foundry*

By D. W. Hammond, A.I.M., M.Inst.F.

(*Continued from page* 438)

The amount of borings which may profitably be fed into a cupola is dependent on both physical or chemical factors. It is found that an addition of 15 to 20 per cent. of the total charge as borings through one machine is the optimum rate, as the addition of higher quantities appears to be responsible for a build-up of swarf around the orifice, due to the melting zone adjacent to the orifice being incapable of melting the swarf at excessive rates of feed.

Control of Feed Rate

As will have been noted, the introduction of the cast-iron swarf into the cupola takes place independently of the placing of the solid metal charges on the cupola by the normal charging system.

TABLE III.—*Cupola Charge Details when using Swarf Additions on Cupola No.* 1. *M. Foundry, September* 17, 1952.

Metal charge.	Composition, per cent.				
	T.C.	Si.	Mn.	S.	P.
2 cwts. Ford pig-iron	3.80	3.20	0.90	0.05	0.30
1 ,, Millom hematite iron ..	3.80	2.30	0.90	0.05	0.05
½ ,, steel scrap ..	—	—	0.40	0.03	0.03
¾ ,, shop scrap ..	3.20	2.20	0.75	0.13	0.30
1½ ,, swarf ..	2.90	2.10	0.70	0.13	0.70

Ferro-alloy Additions : 1 lb. ferro-silicon (75 to 80 per cent. Si.) (=0.08 per cent. Si. addition) and one ferro-manganese briquette (=0.20 per cent. Mn. addition).
Calculated Composition of Charge including Alloy Additions : T.C. 3.17, Si. 2.38, Mn. 0.97 and P. 0.33 per cent.
Specification of Basic Iron required : T.C. 3.2 to 3.3, Si. 2.0 to 2.15, Mn. 0.75 to 0.85, and P. 0.30 to 0.35 per cent.

Whilst it is possible to set the feed machine to deliver borings at a predetermined rate, should slight variations take place in the speed of melting, due to a lowering of blast volume, or temporary shut-down on furnace, it is possible for borings to be fed into the furnace in incorrect ratio to the solid metal being melted. In order to stabilize proper conditions, a system of recording the weight of borings in units of equal weight fed into the furnace at the side of charges put on the furnace has been arranged. The use of this charge board enables the balance between swarf and solid charge to be seen at a glance and the rate of swarf input

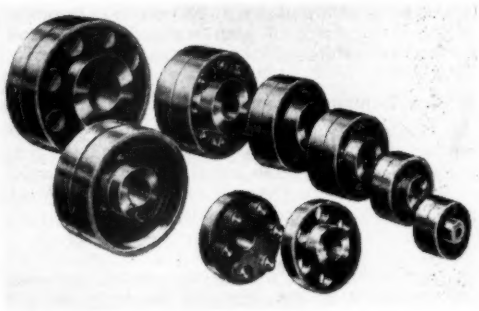


FIG. 10.—*Range of Couplings from* 4½ *to about* 12 *in. dia. produced from Castings made in the Mechanized Foundry at Croft's.*

* Paper presented to the West Riding of Yorkshire branch of the Institute of British Foundrymen.

TABLE IV.—*Working Results for Cupolas Engaged on Swarf Melting.*

Cupola No.	Per cent. Si in basic iron.	Analysis (per cent.)							Mechanical properties (0.875 in. bar).		
									Transverse.		Tensile.
		T.C.	Si.	Mn.	S.	P.	Ni.	Cr.	Load, lb.	Defl., in.	Tons per sq. in.
1	2.03	3.20	2.18	0.84	0.12	0.32	—	—	—	—	—
1	1.95	3.22	2.11	0.83	0.13	0.31	—	—	—	—	—
1	2.00	3.25	2.36	0.85	0.11	0.33	—	—	1,523	0.14	20.0
2	2.10	3.39	2.25	0.83	0.11	0.30	—	—	—	—	—
2	2.05	3.21	2.23	0.80	0.11	0.26	—	—	—	—	—
2	2.03	3.21	2.40	0.80	0.12	0.29	—	—	1,460	0.13	18.4
1	2.12	3.41	2.30	0.69	0.11	0.31	—	—	—	—	—
1	2.05	3.20	2.20	0.66	0.13	0.28	—	—	—	—	—
1	2.00	3.33	2.18	0.70	0.14	0.28	—	—	1,434	0.12	17.4
2	1.98	3.28	2.40	0.72	0.12	0.32	—	—	—	—	—
2	2.04	3.26	2.20	0.73	0.11	0.30	—	—	—	—	—
2	2.06	3.26	2.16	0.69	0.09	0.27	—	—	1,613	0.14	19.6
1	2.00	3.32	2.14	0.78	0.13	0.32	—	—	—	—	—
1	2.09	3.26	2.40	0.77	0.13	0.36	—	—	—	—	—
1	1.98	3.30	2.18	0.87	0.12	0.33	—	—	1,478	0.15 (basis iron)	17.8
2	2.13	3.37	2.31	0.72	0.14	0.31	—	—	—	—	—
2	2.09	3.24	2.30	0.68	0.13	0.33	—	—	—	—	—
2	2.10	3.29	2.32	0.85	0.13	0.29	—	—	1,525	0.15	18.4

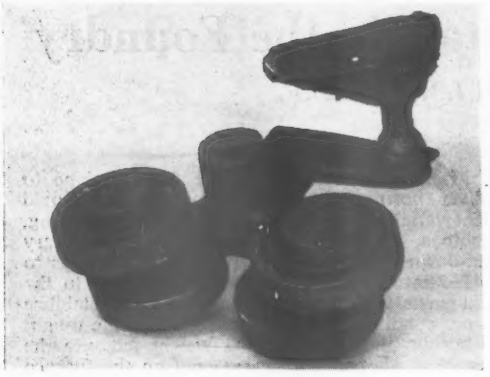


FIG. 11.—*Coupling Casting 4½ in. dia. with Gating and Feeding System attached (Four Castings in One Box).*

speeded up or retarded as may be necessary throughout the melt. Lack of such precautions can lead to irregular results.

Chemical Composition and Mechanical Test Results

It is the first essential to maintain suitable chemical composition, and Tables III and IV give particulars respecting the metal charge and resulting chemical and mechanical test figures obtained by a foundry engaged in melting swarf as part of the cupola charge.

It should be noted that the charge consists of 7 cwt. of solid metal and 1½ cwt. swarf, and pig-iron represents 35 per cent. of the total charge. Before the use of cast-iron borings as part of the charge, it was usual to use 3 cwt. of shop scrap to a 7-cwt. total charge. It is now necessary to use 3½ cwt. of shop scrap to each 7-cwt. solid charge This is due to the fact that the number of solid-metal charges is reduced by the addition of cast-iron borings. Ferro-alloys are used for minor composition adjustment and these are fed with the swarf through the feeder machine, giving good recovery. The metal specification required

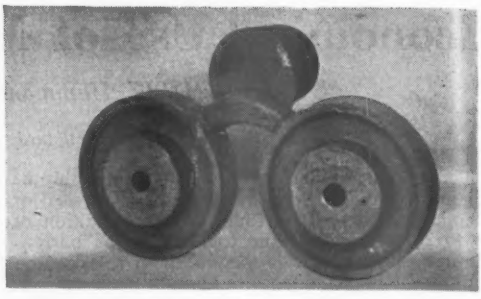


FIG. 13.—*Coupling Castings 7½ in. dia., made Two per Box with a common Runner/Feeder System.*

makes it necessary to use hematite or low-phosphorus pig-iron.

In the calculation of metal mixtures, the losses of silicon and manganese from the swarf during melting appear to be normal and it has been found satisfactory to allow the usual 10 per cent. loss. As the swarf is an integral part of the charge, it is impossible to determine the actual losses but experience does not indicate high oxidation losses. Experiments are in progress to determine the effects of additions of coke and fluxing materials through the orifice.

The Author's experience indicates that the inclusion of swarf in a cupola charge slightly lowers the carbon content, although this can usually be remedied by the elimination of some part of the steel addition or adjustment of coke ratio. The ultimate carbon content is, of course, governed by the deviation of the charged analysis from eutectic composition. There appears to be evidence to suggest that for a given section thickness of casting, and for identical chemical composition, metal containing swarf increases slightly the combined carbon, and the use of inoculation methods to promote graphitization are advantageous. Whilst coke quality has a bearing on sulphur content, the addition of from 15 to 20 per cent. of swarf has shown that sulphur contents between 0.09 and 0.14 per cent. may be expected. The manganese

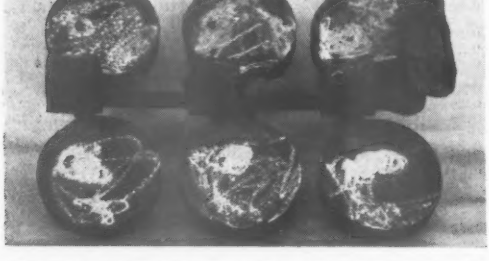


FIG. 12.—*Larger Size of Coupling Casting to that shown in Fig. 11, also with Running System attached.*

FIG. 14.—*Coupling 10½ in. dia., run by One Ingate leading from a V-notch-type Atmospheric Feeder Head.*

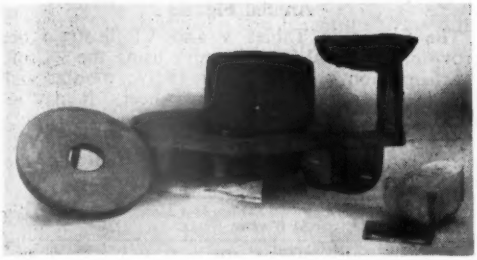


FIG. 15.—*Largest Coupling of the Range Produced (see Fig. 10), showing the Knock-off Core and Cast-iron Skimming Gate (right) and Pattern for its incorporation in the Mould.*

content is maintained at a sufficiently high level to offset any possible ill effects of the sulphur. Recent coke deliveries have shown an ash content between 8 to 13 per cent., and sulphur of 0.70 to 0.90 per cent.; coke ratios of 1:9 are adopted.

Moulding Technique

Whilst there is no evidence that the use of swarf as a component of the cupola charge necessitates any major change in running or feeding methods, foundries using swarf should take the usual precautions to ensure casting soundness. As previously pointed out, total carbon content of the metal may be slightly lower and the tendency for an increase in combined carbon may occur. Both these factors are conducive to shorter freezing ranges and increase in shrinkage. In order to illustrate the methods found very successful for the production of large quantities of repetition castings, the feeding and running methods used for flexible coupling castings are taken as specific examples. Fig. 10 illustrates the range of couplings produced under mechanized foundry conditions from molten iron (containing swarf) of the chemical analysis previously given. The castings range in weight from 6 to 280 lb. and are produced in a series of standard moulding boxes from up to 24 in. square.

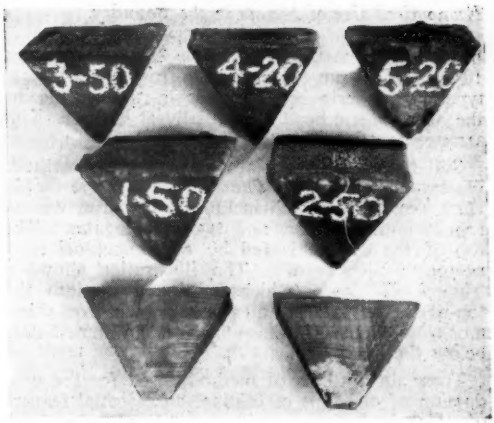


FIG. 16.—*Test Cones used at the Foundry for Observing possible incidence of Gas Absorption or Exudation on Solidification.*

The smallest type of coupling, 4½ in. dia., is made with four castings per box as shown by Fig. 11. Two castings are in the top box and two in the bottom, the flat backs of the castings being formed by a flat core which is placed in the bottom box. The feeder to the castings is situated immediately above the ingates and consists of a V-notched atmospheric feeder head, into which the runner enters *via* a strainer core from the downgate. The next size of coupling is produced as shown in Fig. 12. As shown, these are produced six per box and a central top runner-bar has ingates into each casting set at a reverse angle to the direction of metal flow. An independent feeder head is placed over each pair of ingates to prevent premature solidification at this point. The next size of coupling, 7½ in. dia., is made, two per box, as shown in Fig. 13 and the ingates are fed by a centrally-disposed atmospheric feeding head, with an atmospheric core. The runner from the downgate, which includes a skimmer core, enters the bottom of the atmospheric

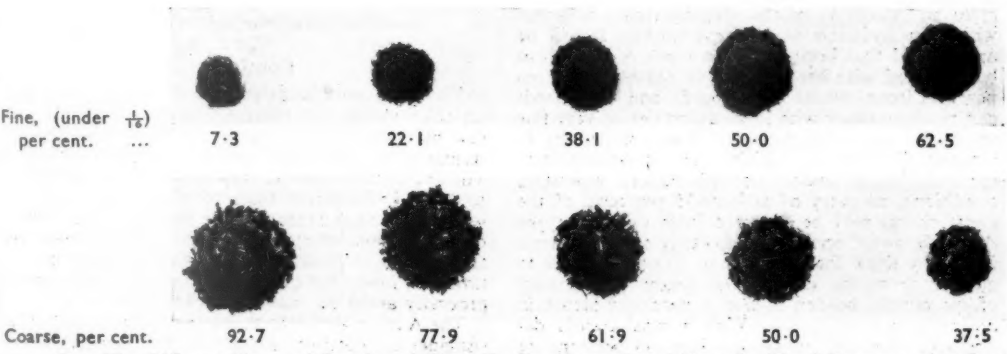


FIG. 17.—*Different Types of Swarf, and Sieve Grading, from A and B grades Metal Recovery of at least 95 per cent. can be expected.*

head where marked. A larger size of coupling, 10½ in. dia., is run by one ingate from one V-notch-type atmospheric head, the down-runner entering the atmospheric head tangentially at its base. This arrangement is shown in Fig. 14.

Still larger couplings are made by the methods illustrated in Fig. 15. The metal enters the mould *via* a downgate, which includes a cast-iron wedge-type skimmer-runner, and two side ingates. The top of the casting is fed by one knock-off type, normal feeder head. The illustration shows a "knock-off" core (which is pinned up into the top-part), the pattern and a sample cast-iron skimmer which is used in the runner system immediately below the downgate.

These illustrations of methods used for the production of one type of casting, an essential feature of which is the necessity for solidity and clean surfaces, is used to typify the practice used with metal containing from 15 to 20 per cent remelted swarf. A further check on the suitability of the iron produced is taken in the form of cone-type solidification tests to examine the metal in respect of gas absorption, and metal containing swarf has not given any evidence of extra gas evolution. The type of test cones is illustrated in Fig. 16 and these do not show any gas cavity or evidence of exudation. The addition of swarf has not affected metal temperature, which is usually between 1,430 and 1,450 deg. C.

It will be appreciated that the cost of running the feeder machine and the labour cost of charging the swarf directly into the cupola compare very favourably with other systems. The overall cost of the swarf charged to the cupola, including capital cost and labour, is not greater than £3 14s. 0d. per ton when calculated on a similar basis to the other costs quoted in Tables I and II.

Influence of Grading on Recovery

One very important factor in the consideration of the use of swarf is the possible metal recovery from the swarf available. Swarf varies considerably in the amount of fines it contains, and Fig. 17 gives an indication of the different types of swarf which are available at different works. It will be appreciated that borings of the types A and B can be produced with broad cuts and heavy feeds from pearlitic irons, whilst high speeds and light feeds can produce swarf with large quantities of very fine material from soft, graphitic irons, as shown in samples D and E. Using the cupola-injector method, whilst under normal cupola operating conditions, recovery of at least 95 per cent. of the swarf charge may be expected from swarf of types A and B, swarf containing upwards of 60 per cent. fines may show losses of above 10 per cent due to ejection from the stack. The height and density of the cupola burden is also a pertinent factor in determining metal yield. With normal cupola design and operating conditions, 90 to 95 per cent. of the borings are reclaimed.

Annual Figures

The figures in Tables V and VI illustrate the provision of metal in a foundry using the "Croft swarf-injection process" over twelve months and include an "economic" balance sheet. It may be noted that a small tonnage of ingoted swarf was used. This was made by pouring into ingot moulds metal produced solely from swarf, fed into the cupola without any other charge material.

TABLE V.—*Melting of Cast-iron Borings in a Mechanized Foundry Over 51 Working Weeks.*

Metal used.	tons	cwt.
Pig-iron	3,351	17
Steel Scrap	443	12
Cast-iron scrap	52	6
Ingot swarf	30	10
Cast-iron borings	1,493	18
Returns	3,773	13
Total metal melted	9,145	16
Output of castings	5,186	15
Cast-iron borings as a percentage of total melt		16.3
or, as a percentage of new metal used		28.4
	Tons	Cwt.
New metal used (including borings) =	5,463	14
Output of castings =	5,177	5
Therefore, loss in melting =	286	9

This loss is equivalent to 5.23 per cent. of the total weight of pig iron, steel and cast-iron borings used.

TABLE VI.—*Comparison of Metal Consumption Based on 1952 Results for the Mechanized Foundry.*

Total metal charged ... 9,144 tons

Mixture (not using borings):—
Pig-iron ... 3 cwt.
Scrap ... 3 cwt.
Steel or machinery scrap ... 1 cwt.

Total consumption:	tons	Consumption when using borings:	tons.
Steel	1,306	Steel	443
Pig-iron	3,919	Remelted ingots	30
Scrap (including 94 tons bought scrap)	3,919	Pig-iron	3,352
		Scrap (including 52 tons bought scrap)	3,825
		Cast-iron borings	1,494

Metal saved:—	£	s.	d.	Extras used:—	£
566 tons pig-iron at £16 2s. per ton	9,112	0	0	1,494 tons C.I. borings at £3 10s. per ton	5,129
863 tons steel at £7 per ton	6,472	0	0	30 tons remelt ingots at £5 10s. per ton	165
42 tons bought scrap at £7 5s. per ton	304	10	0		
	15,888	10	0		5,294

Net saving ... £10,594 10s.
(The economy of 566 tons of pig-iron should be noted.)

Conclusion

The various methods for swarf recovery outlined all offer means for bringing into use a volume of raw material which hitherto has been allowed substantially to pass from the metallurgical industry. The use of this material may appear more attractive to "tied" foundries than to those who have to seek the borings from outside sources. It is, however, very necessary that attention be focused on the successful reclamation of this material at all times, to lower the cost of molten cast iron and to generally assist the national economy.

The Author wishes to thank the directors of Crofts (Engineers), Limited, Bradford, for permission to publish the statistics included in this Paper.

DISCUSSION

MR. G. W. NICHOLLS said his firm had used the Croft process for approximately six months, and were highly satisfied with it, and had gradually overcome a number of minor snags. He asked if Mr. Hammond had considered the use of a better heat-resisting steel for the rammer? If anything went wrong and the ram had to stop and the borings became lodged, then a new ramming slide was entailed. Secondly, he agreed that the sulphur content was usually about 0.15 per cent., and his firm had tried to reduce this by pumping-in soda ash, but although there was de-sulphurization of the metal, there was definite erosion of the lining round the melting zone. He wondered if Mr. Hammond had any experience of this.

MR. HAMMOND said the secret lay in balancing the soda-ash addition to the necessity for its use. Some founders had tried the process and had experienced no snags; on the other hand there were cases where the question of the life of the ram had caused difficulty. In his own particular foundry, it was found that the normal steel ram of 0.4 per cent. carbon was satisfactory, and no difficulty was found due to stoppage of ram in service. However, the ram should not stop for any length of time, and it would be of no disadvantage to use ram of heat-resisting steel. As to the wear resistance of the ram, it had been found that several months could elapse before it was necessary to touch-up this component. Dealing further with sulphur content, it had been found throughout the years that the use of swarf tended to increase the sulphur pick-up, due to its high surface area. A feature of the process was that the swarf was injected at a point adjacent to the zone of maximum heat, so that its time for meeting was short, but, even so, there certainly seemed to be a slight tendency for sulphur to be picked-up. With existing conditions of coke quality, it was very difficult to tell whether the extra sulphur was due to the use of swarf or to the coke itself. There had been cases when the sulphur content went down to 0.08 per cent. and in a week's time was back to 0.12 and 0.13 per cent. However, although it was recorded that there was sometimes a slight increase in sulphur, there had been no difficulty in using the final metal, and that was what counted.

Effect of Varied Melting Conditions

MR. BOLTON said he was connected with a mechanized foundry having a 40 in. cupola where a large variety of castings were made. On one particular day, they might melt at a rate of 3½ to 4 tons per hour, and the next day at 6 to 7. Obviously, the b'ast volume and coke ratios had to be altered, and he asked if the method of swarf introduction would prove satisfactory under such varying conditions of melting.

MR. HAMMOND said the rate of addition of swarf depended on the speed at which the feeding apparatus worked, and that was controlled by means of the valve on the control panel. It could be varied from 5 up to 15 to 20 cwts. per hour. If the cupola was running with a low blast-volume, suitable adjustments to the speed of feeding of the swarf would have to be made, and this could be done by anticipating the amount of metal obtained from the cupola. If the correct ratio of swarf to charge was maintained, the speed of melting was immaterial.

MR. BOLTON said he appreciated that the rate of feed of the swarf could be varied, but he had been mainly thinking of the effect of the concentration of oxygen to carbon monoxide and dioxide inside the stack. When melting at 6 to 7 tons per hour, his foundry had to charge larger amounts of high-carbon pig and scrap, whereas when melting at a low rate, under reducing conditions, they could charge a higher amount of steel. Had Mr. Hammond found any variation in oxidation loss under such conditions?

MR. HAMMOND said his observations were limited to those on cupolas working under normal conditions. If conditions were such that oxidation was liable to take place, it was quite natural to expect that swarf would melt more readily than a normal charge. If swarf injection was satisfactory at times of maximum melting rate, a reduction of air input would certainly not alter the effectiveness of swarf usage.

Vote of Thanks

MR. BOLTON said Mr. Hammond was to be complimented on his Paper for several reasons. It had been a most comprehensive survey. Foundry costs would have to be reduced, and the swarf-recovery scheme was a most successful way of doing this. He himself had had reason to examine other methods of reclamation, and this one seemed to be most satisfactory.

MR. W. H. COLLINSON said that Mr. Bolton had spoken of Mr. Hammond's prowess from the foundry angle, but he would like to add that Mr. Hammand was mechanically inclined, a fact which was of great value. This had been well demonstrated by the method he developed of adding swarf to the cupola, for many foundrymen must look upon it as quite revolutionary. In fact Mr. Hammond had made a "boring" subject extremely interesting.

MR. HAMMOND in thanking the meeting, paid tribute to his colleagues and said that if anything in his Paper had acted as an incentive to people in any direction leading towards the conservation of metals, he would have been fully repaid.

Productivity Committees in the North-west

Ten district advisory committees to help stimulate efficiency and output in industry are being set up in the north-west, said the chairman of the North-West Regional Board for Industry, Mr. W. D'Arcy Madden, last week. The British Productivity Council is seeking the aid of all regional boards for industry in setting up these committees in towns throughout the country; in all there will be 105. Regional boards will do the provisional work of inviting suitable persons to attend conferences in various towns. Once productivity committees have been formed they will be entirely independent.

Quality in Light-metal Castings

(*Continued from page* 474)

The meticulous control necessary to ensure conformity with specifications cannot be exercised without expense to the supplier, who has to employ qualified and experienced supervisory staff, and equip them with costly instruments and apparatus. There are many ways in which the cost of castings could be reduced: by using lower-grade metal, by relaxing control of melting and pouring temperatures, by less-frequent sampling, and less-vigorous inspection and testing. To the customer who does not check the quality of castings—and not all are equipped to do so—the deterioration may not at once be apparent, but will almost certainly show up sooner or later with, possibly, dire consequences.

The Light Metal Founders' Association exists to maintain, by the free interchange of technical information and by friendly co-operation, a level of quality in light-alloy castings worthy of a progressive industry. Its members realize that only by doing so will they be able to develop and enlarge the fields of application of light alloys. Skimping is recognized to be short-sighted and detrimental to real progress, however keen price competition may be. For the individual founder, it is far better to lose an order than to win it at the expense of reputation, and for the industry as a whole gains made in the invasion of markets hitherto held by ferrous or other non-ferrous metals cannot be consolidated if they have been won by reckless tactics. But, to some extent, founders are in their customers' hands, and if no value is set on quality control, the pressure of competition may force its abandonment.

Dorman Long Development Plan

Dorman Long announce that a start has been made on Stage III of the company's post-war development plan. This stage, which has been formally approved by the Iron & Steel Corporation of Great Britain, is more extensive than the two preceding stages and involves expenditure of approximately £36,000,000.

The largest item in Stage III is the installation at Lackenby of a universal beam and heavy section mill with an annual output of 400,000 tons of rolled products. A fifth steel furnace is being added to the melting shop to bring the annual output of this new steel works up to 625,000 tons of ingots, and two 27-ft. 6-in. hearth blast furnaces with a joint capacity of 750,000 tons of iron per annum, and a large new coke-oven plant are to be installed at Cleveland works which will carbonize annually 1,300,000 tons of coal.

New Offices in London

The Minister of Works, Mr. David Eccles, has recently announced that six licences had already been granted and another two were about to be allocated for building offices in the City of London. Licences totalling £10,000,000 will be issued to cover 30 buildings, of which 75 per cent. will be within the City boundaries. Among the more important buildings to be erected will be the headquarters of the Federation of British Industries and the Trades Union Congress. A number of university extensions, including laboratories and chemistry buildings, will be licensed.

Industry's Reactions to the Budget

The National Union of Manufacturers described the Budget as "a courageous and realistic Budget which will go some way towards providing the incentives which industry so badly needs." It hoped, however, that the full rate of 40 per cent. for initial allowances would be restored as soon as possible.

Expressing satisfaction that the Chancellor had recognized the need for lightening the crippling load of taxation on industry, the retiring president of the Federation of British Industries, Sir Archibald Forbes, appealed to industry to maintain the effort already made in the export field, and to seek to increase this by another determined assault on those markets. He was speaking at the Federation's annual meeting. The decision to abolish the excess profits tax next year would remove an outstanding deterrent to development, he said.

The council of the Engineering Industries Association, whose president is Lord Davison, in a statement issued last week, welcomed the restoration of the initial allowances which "will encourage efficiency, development, and expansion, and the undertaking of even more responsibility for production by those to whom the incentive was formerly denied."

French Pact with Spain

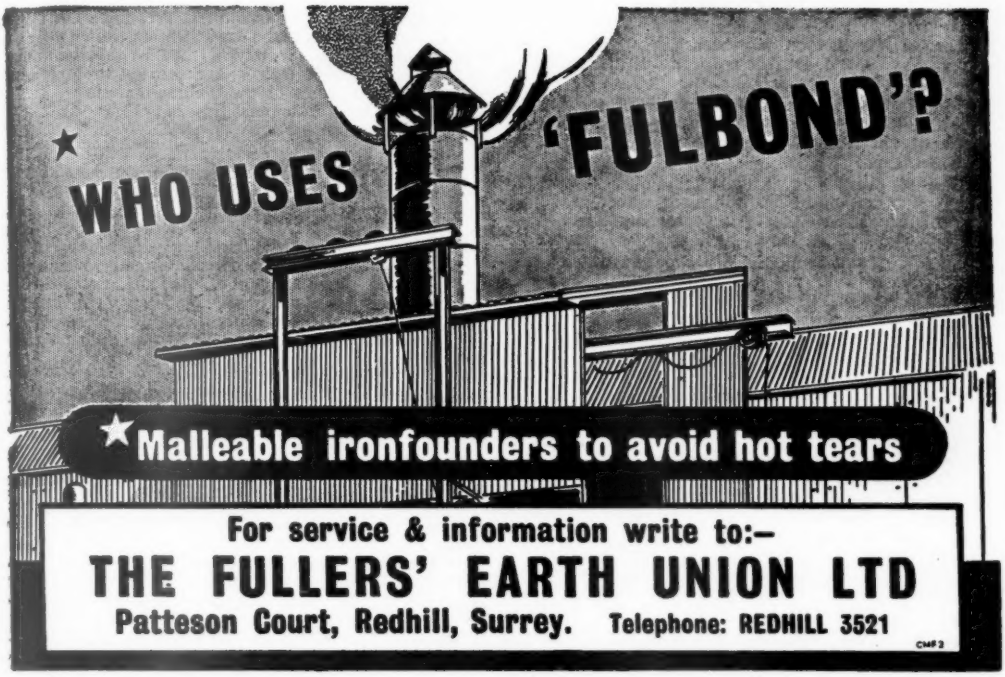
Under a new agreement recently signed between France and Spain, France is to grant two to seven year credits to Spain for the purchase of equipment goods to the value of 15,000 million francs (£15,000,000). France will receive orders for the steelworks at Aviles to the value of 6,400 million francs (£6,400,000). These include the whole electrical equipment of the steelworks, all the machinery for the turbines of the combine, a complete steel plant, trains, compressors, Pitts ovens, special wagons, and a Diesel locomotive. Later France will obtain a second batch of orders for the Aviles works. British industry has already obtained important orders in connection with the Aviles project.

Equipment other than that for Aviles to be supplied to Spain by France will include equipment for railways, mines, and public works, considerable quantities of electrical material, tractors and other agricultural machinery, and machine tools.

Historic Steamroller

A 61-year-old steamroller which has been reconstructed in an Oldbury foundry, and which has been repainted in its original gold and green, is to make a television appearance on June 7, when it makes its last journey along City Road, Birmingham, which it helped to lay sixty years ago. Afterwards the steamroller is to occupy a place of honour in Birmingham's new science and industry museum which the Lord Mayor is to open on June 19. It was the first steamroller to be registered in Worcestershire and the second in Warwickshire. Its working life ended in 1950, and in view of its age and historic interest, its owners gave it to the museum authorities. Two years' work, involving country-wide enquiries to obtain certain parts (including a long-obsolete chain steering gear) has followed for the repair and reconstruction of the roller.

FACTORY SWING DOORS with rubber panels will be shown by Dunlop Rubber Company at the Castle Bromwich section of the British Industries' Fair this month.



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Personal

MR. R. C. BENSON has been appointed a special director and MR. J. DUTHIE a director of the Darlington Forge, Limited.

MR. J. A. GRAHAM, sales manager of the Distington Engineering Company, Limited, Workington (Cumberland), has returned from a 20,000-mile tour of the Americas and Canada.

THE MINISTRY OF MATERIALS announces that MR. R. F. RUCKER has been appointed director of non-ferrous metals from May 1 in succession to MR. C. A. JAMES, who has resigned.

MR. J. HAROLD WOOD has been appointed technical director of B. Thornton, Limited, iron and steel works engineers, of Huddersfield, and MR. H. W. HENDERSON has been appointed secretary.

MR. T. A. MCKENNA, chairman and managing director of the Staveley Iron & Chemical Company, Limited, Hollingwood (Derbys), is in America on a business trip and expects to return at the end of April.

SIR CLAUDE D. GIBB, chairman and managing director of C. A. Parsons & Company, Limited, Newcastle-upon-Tyne, has returned home after a 37,000-mile tour of Canada, Australia, and the Far East. The tour lasted six weeks.

MR. ROBERT CONNELL, who joined Mavor & Coulson, Limited, Glasgow, in February, has been appointed foundry manager. For 11 years he was with James Howden & Company, Limited, engineers, of Glasgow, later joining Rolls-Royce, Limited.

MR. COLIN GRESTY, immediate past-president of the Institute of British Foundrymen, has been appointed a director of the North Eastern Marine Engineering Company (1938), Limited, Wallsend-on-Tyne and Sunderland—a company with which he has been associated for over 40 years.

DR. S. W. SAUNDERS, who was appointed chairman of the lime division of Imperial Chemical Industries, Limited, three years ago, has been appointed joint managing director of the Billingham division. He succeeds DR. R. HOLROYD, who has been appointed to the main board.

MR. R. J. SHAWYER has been appointed general manager of Newman Industries (Australia) Pty. Limited, the recently established subsidiary company of Newman Industries, Limited, Yate, Bristol. MR. R. F. SHEARMAN has been appointed technical representative for Newman Industries Limited in the United States and left for New York on April 20 to take up his new appointment.

EIGHTY-FOUR YEARS OF AGE last Saturday, MR. FREDERICK HOAR, of Syston, Nr. Leicester, was as usual hard at work at the Thurmaston iron foundry of H. J. Cresse & Sons, Limited, on Wednesday last. "I'll retire when I get the sack," he told his employer recently. Mr. Hoar, who came to Syston from London about 50 yrs. ago, has been working with his present employer for about 15 yrs. In spite of his age, Mr. Hoar arrives at work in the mornings at seven, and finishes at 5.30 p.m. He works a five-day week. On Christmas Day, 1950, Mr. and Mrs. Hoar celebrated their golden wedding.

DR. W. DAVIES, M.SC., PH.D., head of the ore-dressing laboratory at the central research and development department of the United Steel Companies, Limited, has been selected to be one of the two official delegates to the O.E.E.C. mission to visit Continental countries in order to gather facts about research of low-grade ores and to consider measures which might be adopted to ensure closer co-operation between the organizations engaged in mineral dressing. Dr. Davies is a member of the Iron and Steel Institute, a Fellow of the Geological Society, a member of the burden committee, British Iron and Steel Research Association, and a member of the melting-materials panel of the British Steel Founders' Association.

MR. F. ALBAN HARPER, who is to be president of the Lancashire branch of the Institute of British Foundrymen for the next session, is technical representative for the north of England for William Cumming & Company, Limited, Chesterfield. Now 50 yrs. of age, he was born and educated at Stockton-on-Tees, Durham, and joined the firm's Middlesbrough office when he was 16. Seven years later he was a founder member of the Middlesbrough branch of the Institute, becoming its honorary secretary two years later. In 1930, as honorary secretary of the annual conference committee, at Middlesbrough, he was the youngest secretary ever to run a conference. Mr. Harper, who lives at Rochdale, left for the Manchester area in 1935, became assistant secretary of the Lancashire branch about six months later and honorary treasurer in 1939.

Obituary

A. H. MOORE

THE DEATH is announced of Mr. A. H. Moore, chairman and managing director of the Standard Brass, Iron & Steel Foundries, Limited, of Dunswart, South Africa. Mr. Moore was born in Swansea and at one time was a moulder at the works of John Williams & Sons (Cardiff), Limited. About 40 years ago he went to South Africa and Rhodesia where he started up the foundry side of the engineering business of Issels & Company. Between the two wars he was a constant visitor to this country and on several occasions he participated in the Annual Conferences of the Institute of British Foundrymen, of which body he was for many years the honorary corresponding member for South Africa. Together with Mr. H. Hobbs, he started the Standard Brass Company, Limited, and after much real pioneering effort and hard work converted it into one of South Africa's principal foundries. He served as Mayor of Benoni with real distinction. He was a keen patron of sports and in recognition of this the local rugby football club is called the Willowmoore Park. During the war he gave the British Government a Spitfire christened "Benoni." Foundrymen throughout the world will learn with sorrow the passing of a truly great pioneer foundryman.

MR. FREDERICK JAMES SWINDELL, who died recently at the age of 47, had been employed for 26 years by Ley's Malleable Castings Company, Limited, Derby, as a combustion engineer.

THE DEATH has occurred at his Birmingham home of MR. WALTER COLLINS, at the age of 75. He was works manager of H. W. Ward & Company, Limited, Selly Oak, with whom he had served for 60 years.

THE DEATH has occurred, at the age of 58, of MR. CLIFFORD V. MURRAY, assistant chief designer of Sir W. G. Armstrong Whitworth (Aircraft) Limited. Mr. Murray was one of the country's pioneer aircraft draughtsmen and designers, and was associated with every type of aircraft produced by the Coventry firm. He joined the Siddeley Deasy Company in 1917 and when Sir W. G. Armstrong Whitworth (Aircraft) Limited was formed he became chief draughtsman. In recent years he had been concerned with research and development in the field of guided weapons, on which project he was deputy chief engineer.

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News in Brief

TWO BLAST-FURNACE WORKERS employed by Barrow Ironworks, Limited, were killed last week by an explosion caused by a breakout of molten iron from the furnace.

ARRANGEMENTS have been made for a party from the Institute of Welding, North London branch, to view the works of the Ford Motor Company, Limited, at Dagenham, Essex, on May 7.

THE DISTINGTON ENGINEERING COMPANY, LIMITED, Workington (Cumberland), has secured a further order from Stewarts and Lloyds, Limited, for 50 ladles, the largest order of this type ever placed with the company.

IT HAS BEEN EXPLAINED by the Australian Minister for State Development that the ultimate aim of the Villiers Engineering Company, Limited, Wolverhampton, in establishing a factory at Ballarat, Victoria, is to export agricultural engines to Asia.

SIGMUND PUMPS, LIMITED, Gateshead, is completing an order for the supply of 3,500 pumps for irrigation purposes to a Turkish State-operated agricultural machinery corporation. This is one of the largest contracts for the supply of pumps ever placed with a British firm.

MORE THAN 85 PER CENT. of engineering firms in the south-west have reached agreement with the unions to work over the Whitsun weekend and take a long break for the Coronation. The men will be away from work from Friday evening, May 29, until the morning of Wednesday, June 3.

A SCHEME whereby small manufacturing firms in the U.K. would make components to be shipped for assembly in large units by U.S. firms, thus enabling small companies to play a direct part in the export trade for the first time, is being developed by the National Union of Manufacturers.

MIDDLESBROUGH CORPORATION has approved plans for new metal-melting cupolas, and additions and amendments to the layout of the factory, on the East Middlesbrough trading estate, of Crewdson, Hardy & Company, Limited, high-duty alloy and grey-iron casting manufacturers, of Middlesbrough.

RANSOMES, SIMS & JEFFRIES, LIMITED, Ipswich, is building, with Government assistance, a factory to manufacture Diesel engines for the defence programme in collaboration with Davey Paxman & Company, Limited, Colchester. Ruston & Hornsby, Limited, Lincoln, is also making the same engine.

VICTOR MOYLE & COMPANY, founders and pattern-makers, of 38, Park Road, Hampton Wick, are exhibiting at the British Industries Fair, Olympia Section, on stand H.1, and will include in their display a cast-iron yacht keel weighing about 2 tons and various light-alloy and gunmetal deck and under-water fittings for boats.

MR. L. J-B. FORBES has been appointed general representative in Canada of Vickers, Limited, and of its subsidiary and associated companies. Mr. Forbes, whose address is Fourth Floor, 165, Bloor Street East, Toronto 5, will be available for consultation with Canadian undertakings desirous of establishing business relations with the Vickers Group.

THE B.I.C.C. GROUP has been actively concerned with the supply and installation of cables for the electrical installation of the new extensions of John Summers & Sons, Limited, at Shotton, which will be inspected on April 29 by H.R.H. the Duke of Edinburgh. The new extensions comprise coke ovens, blast furnace, a power station, melting shop and associated equipment.

TWO NEW WINGS which will form a rehabilitation centre for the Colville Group convalescent home at Skelmorlie, Ayrshire, were opened on Saturday by Mr. Harry Yates, managing director of Smith & McLean, Limited, and a director of Colville, Limited. The home, which has accommodation for 30 people, was originally opened 6 years ago and is the Group's war memorial.

BRITISH RAILWAYS are to re-introduce from May 1 the pre-war "Green Arrow" service which enables traders to "register" by rail full wagon loads of freight traffic to the port for export, except traffic to Ireland. Under this scheme, railway offices *en route* receive advice, by telephone or telegraph, of the consignment's passage, and a constant watch is maintained until the goods are finally delivered. The sender can also ascertain in advance when delivery is likely to be effected. Each consignment sent under this service costs 2s. 6d. and is labelled with a "Green Arrow" label which identifies it throughout its journey.

BELIEVED TO BE one of the largest loads ever to travel by road in Britain, a giant steam accumulator, more than 60 ft. long and 14 ft. dia., which weighs 60 tons, left the engineering works of Cochran & Company (Annan), Limited, on April 15. Pulled on a 32-wheeled trailer drawn by two tractors, it will take 11 days to cover a 400-mile journey under constant police escort. It is to be installed in the Silvertown refinery, London, of the sugar firm of Tate & Lyle, Limited, and is estimated to save the refinery 2,000 tons of coal a year. Another accumulator of the same size will be despatched by the Annan firm to the same destination in two or three months' time.

THE SECRETARY OF a large Scottish engineering firm which has a considerable export trade, described the capital expenditure concession in the Budget as a most valuable one so far as manufacturers were concerned. He explained that most firms just could not afford the cost of modern tools. When plant was from 25 to 40 yrs. old it raised a tremendous problem. If it originally cost, say, £1.000, its replacement to-day would cost around £6,000, and it had not been possible in most cases at the allowed rates of depreciation to build up sufficient capital reserves for replacements. New plant reduced costs, and that in turn helped export work; it had a "snowball" effect.

IN A FOREWORD to the programme for the third foremen's residential course organized by the Midland-area training committee of the British Iron and Steel Federation at Moreton Paddox for the week beginning April 20, Mr. A. G. B. Owen (of the Rubery Owen Group) refers to the importance of foremen thoroughly equipping themselves to maintain their influential position in industry. Mr. Owen is chairman of the training committee. "To-day's problems, when efficiency in production is so vital, demand a greater breadth of knowledge and human understanding than ever before in the country's history," he says. Speakers at the course include many leading Midland industrial experts.

SIR ARTHUR SMOUT told members of the Birmingham Metallurgical Society—the oldest organization of its kind in the country—at their annual dinner on April 15, that as technologists, they had succeeded to a high status and position of power in the modern economy, but they had a responsibility to see that their power was used to the best purpose. "This country's greatest need is for leaders and inspired leadership," Sir Arthur said, "and in no direction is it more necessary than in industry, trade and commerce." He added "Over the past 50 yrs. the metallurgical industry has attracted some of the finest brains in the country—brains of a calibre that once went into the law, the Civil Service, the church, and the fighting services."

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Raw Material Markets

Iron and Steel

The demand for foundry pig-irons has slackened proportionately with the smaller demand for castings, and producing furnaces can generally deal comfortably with the demands made upon them. Makers of hematite pig-iron form the exception, commitments with the steelworks having a prior claim. It is understood that there is a prospect of increased production of Welsh hematite in the near future. In the meantime, the hematite needs of the foundries cannot be satisfied fully from home furnaces, but the tonnages now being imported are going a long way towards meeting present requirements.

Blast-furnace outputs are not adversely affected by the decline in demand from the foundries, as of the 105 producing furnaces, the greater proportion is engaged on basic steelmaking pig-iron, for which there is an insistent and unsatisfied demand. The furnaces are provided with adequate supplies of ore, but coke is not so plentiful, nor is the quality always up to the desired standard.

Scrap supplies are better, and the foundries are able to obtain their requirements in the lighter qualities, but there is still a good demand for the heavier grades of cast-iron and machinery scrap. Foundry coke, ganister, limestone, and firebricks are obtained in adequate quantities.

There is some indication that the supply of steel semis for the re-rollers is improving, but some users are still short of steel, particularly in small billets. The demand for finished steel is upheld, although the total tonnage of business offering has declined a little.

Non-ferrous Metals

The downward trend of non-ferrous metal prices showed little sign of coming to an end last week, although it is true that tin closed well above the lowest point registered in the daily published quotations, which was £680 for three months. On balance, cash tin declined by £65 and three months by £55, the backwardation being £15. Zinc displayed considerable weakness, falling by £4 17s. 6d. for April and £4 10s. for July, a satisfactory feature, however, being the contango of 17s. 6d. Lead was equally weak, April closing £5 down and July £5 5s. Unfortunately, the premium for early metal persists and at the end of last week there was a backwardation of nearly £3.

In New York, lead declined last week to 12½ cents, while zinc remained at 11 cents. Copper, too, looked easier and the E. & M.J. average dropped to 33.62 cents f.a.s., this being only 12 points above the level at which the Ministry buys its copper. Belgian copper interests appeared as cheap sellers, first at 32 cents and subsequently at 30 cents, so that it is not surprising that the Government has given notice to the producers of its desire to terminate the present arrangement. Some days may elapse before a new level is agreed and, in the meanwhile, the trade is left guessing what the fall will be. All depends upon what the producers are prepared to concede, but the Ministry, holding big stocks, can afford to be fairly independent in its attitude. As we write, it would seem that something in the nature of a £30 cut would not be at all surprising. Naturally enough, brass and copper scrap prices have fallen in sympathy with the altered outlook for virgin metals.

The British Bureau of Non-ferrous Metal Statistics has published the February figures, which show a further decline in activity. Consumption of copper, virgin and scrap, was 37,669 tons, compared with 42,740 tons in January, but stocks in the U.K. went up by nearly 12,000 tons to 146,911 tons. In zinc, the trend was similar, total stocks at 20,401 tons being about 4,000 tons more than in January. Consumption, virgin and secondary, at 20,311 tons, compared with 21,179 tons a month earlier. Stocks of lead stood at 16,518 tons at the end of February, a drop of about 11,000 tons on the month. Consumption also decreased, from 27,192 tons in January to 24,552 tons in February, the comparison being on the basis of virgin and secondary metal. The Copper Institute stated that deliveries of copper to domestic users in March were 133,460 short tons, while production of refined copper was 112,015 short tons. Stocks decreased by about 5,100 tons to 55,800 tons.

Official tin quotations were as follow:—

Cash—April 16, £730 to £735; April 17, £730 to £735; April 20, £685 to £690; April 21, £695 to £700; April 22, £700 to £710.

Three Months—April 16, £720 to £725; April 17, £720 to £730; April 20, £675 to £680; April 21, £690 to £692 10s.; April 22, £695 to £700.

The following official zinc prices were recorded:—

April—April 16, £70 10s. to £70 15s.; April 17, £70 10s. to £70 15s.; April 20, £67 17s. 6d. to £68 2s. 6d.; April 21, £67 5s. to £67 10s.; April 22, £65 10s. to £66.

July—April 16, £71 10s. to £71 15s.; April 17, £71 7s. 6d. to £71 10s.; April 20, £68 15s. to £69; April 21, £68 to £68 5s.; April 22, £66 to £66 5s.

Official prices of refined pig-lead:—

April—April 16, £81 to £81 10s.; April 17, £80 5s. to £80 15s.; April 20, £78 15s. to £79; April 21, £78 to £78 10s.; April 22, £74 15s. to £75.

July—April 16, £78 10s. to £78 15s.; April 17, £78 to £78 5s.; April 20, £76 15s. to £77; April 21, £76 5s. to £76 10s.; April 22, £73 to £73 5s.

Pig-iron and Steel Production

Latest steel and pig-iron output figures (in tons) compare with earlier returns as follow:—

—	Pig-iron.		Steel ingots and castings.	
	Weekly Average.	Annual Rate.	Weekly Average.	Annual Rate.
1953—January ..	213,900	11,121,000	346,300	18,009,000
February ..	213,500	11,104,000	352,400	18,325,000
March ..	215,700	11,216,000	351,400	18,272,000
1st quarter ..	214,500	11,152,000	350,100	18,207,000
1952—January ..	198,500	10,319,000	293,000	15,234,000
February ..	197,400	10,263,000	313,100	16,281,000
March ..	201,700	10,490,200	320,200	16,648,000
1st quarter ..	199,100	10,355,000	307,500	15,991,000

New Engineering Wage Claim

At a meeting of the Confederation of Shipbuilding and Engineering Unions at York on April 9, Mr. Harry Brotherton, chairman of the confederation, gave warning of a new wage claim to be put forward on behalf of engineering workers.

Executives of the 38 unions affiliated to the confederation meet in London on April 29. Immediately before this meeting, the confederation's executive will meet to "formulate a recommendation as to the amount of the increase for which application shall be made."